OBSTETRIC FORCEPS

ITS HISTORY AND EVOLUTION

BY

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PREFATORY NOTE.

THE obstetric forceps has been aptly described as "a noble and beneficent instrument, rescuing more lives and cutting short more pains than all the other instruments in the professional armamentarium." An account of the history of its invention and gradual evolution must therefore be interesting and instructive. Indeed, that there is romance about its invention, may be seen by a reference to the section on "the Chamberlens" It has been argued by more than one writer, with some show of reason, that the obstetric forceps was known long before the time of the Chamberlens and "the only merit they are entitled to, is that of improving an old and less perfect instrument designed for the same purpose and described in works with which the inventor who lived at a time when medical literature was circulated in a language common to the learned in all countries could hardly have failed to be conversant." It has even been claimed that the obstetric forceps was known and described in the Ayurveda (the ancient Hindu medical work probably dating back to 1500 B.C.). This subject has been dealt with in the section on "Pre-Chamberlen period."

The history and evolution of the obstetric forceps have been studied by various writers. The classical work of Mulder on "Historia Literaria et Critica Forcipum et Vecticum," published in 1794 and translated into German by Schlegel in 1798, is the earliest monograph on the subject. Rist's essay on the forceps appeared in 1818. This was followed twenty years later, by Kymell's Historia. In 1841 Busch published his "Midwifery" and Atlas with a very good account of the forceps. Sonntag's thesis came out in 1853. Kilian published his "Armamentarium Lucinae Novum" in 1856 containing a series of plates of forceps and other obstetric instruments; he also published an obstetric atlas which contained a number of illustrations of forceps. Other important theses on forceps followed, viz., Poullett's thesis on forceps in 1883, Ingerslev's

book in 1891, Witkowski's "Arsenal Obstetrical" (1894), Rolland's thesis on parallel forceps (1905). It was not till 1882 that Aveling's book on "the Chamberlens" came out, a monument of patient research, that settled once for all the claims of Peter Chamberlen as the inventor of the forceps. Between 1912 and 1915 Alban Doran published a series of articles dealing with "Some Eighteenth Century Forceps," which have supplemented Aveling's work. I have made full use of their writings and desire to place on record my indebtedness to these British research workers in this field.

It will be seen that so far no special work on this subject has been published in the English language and it occurred to me that a comprehensive treatise in English on the obstetric forceps is a desideratum. Such a work should contain not only the history and evolution with detailed description of the instrument but also its indications, use and abuse, methods of application, dangers, (both to the mother and the child), its value as compared with any other feasible operation, its medico-legal aspect, statistics, etc.

With this object in view, I commenced in 1917 to collect materials for such a work. The Index Catalogue of the Library of the Surgeon-General of the U.S. Army, of which two series were then available, brought up the references to 1900. The total number of references in these came up to 902.

All the monographs and journals available in Calcutta were consulted and the references verified as far as possible. I soon realised that my store of these was far from complete and therefore went through the following obstetric journals and periodicals, complete sets of which are in my private library:—American Journal of Obstetrics continued on as American Journal of Obstetrics and Gynecology; New York Journal of Obstetrics and Gynecology continued on as American Gynecological and Obstetrical Journal; American Gynecology; Obstetrical Journal of Great Britain and Ireland; Journal of Obstetrics and Gynaecology of the British Empire; Surgery, Gynecology and Obstetrics, and International Abstract of Surgery; Year-Book of Obstetrics and Gynecology, (Practical Medicine

Series); International Clinics; Progressive Medicine; Transactions of the Obstetrical Society of London continued on as proceedings of the obstetric section of the Royal Society of Medicine, London; Braithwaite's Retrospect of Medicine; The British Gynaecological Journal; Transactions of the Edinburgh Obstetrical Society; Transactions of the American Gynecological Society; Transactions of the German Gynaecological Society; Transactions of Obstetrical Society of Berlin; Annals of Gynecology and Pediatry; Centralblatt fur Gynakologie; Jahresbericht uber die gesamte Gynakologie und Geburtshulfe; Transactions of the American Association of Obstetricians Gynecologists and Abdominal Surgeons, and International medical and surgical survey.

While I was at work, the third series of the Index Catalogue came to hand, which brought the references down to the end of 1924. These brought the total number of references in the three series of the Index Catalogue to 1058.

I have been able to add 1014 other references to this list, collected from the Index Medicus; Neale's Medical Digest; Cumulative indices of Journals and the individual volumes of the journals in my own library. Thus the grand total comes to 2072. In addition, a very large number of text-books on Midwifery, 173 books and papers on the History of Medicine and 59 catalogues of Surgical Instruments have been consulted.

It will be seen that the labour involved in collecting materials for the book and arranging them has been enormous, as practically every reference had to be verified. My ignorance of the different languages from which the compilations had to be made viz. French, German, Latin, Danish, Italian, Spanish, Polish, Russian and Japanese, added to the difficulties which have had to be overcome by the help of friends who know these languages. Without their assistance the publication of the book would have been impossible. Moreover, I have not been able to devote as much time to this work as I should have liked to, busy as I am with my ordinary professional duties as well as the arduous administrative and teaching work in connection with the Carmichael Medical College and Hospitals.

Indeed the work would have been beyond my capacities had I not happened to possess a fairly complete obstetric library, wherein I could work whenever I had time to spare.

As the material was found to be too bulky for a single volume, I decided to bring out first the portion dealing with the history and evolution of the obstetric forceps, leaving the remaining divisions of the subject for a subsequent volume. The present volume deals with 920 references, excluding those from text books on Midwifery. I shall, however, append the complete list of references for the second volume, so that the subject can be dealt with by a future worker, if I am unable to complete the work as I hope to do.

I have attempted wherever possible to quote from the original source and give the translation as literally as possible to preserve the author's original idea. For that reason the language may sometimes appear peculiar. The spelling of proper names as given in different languages by various authors has been retained, intentionally.

As Mulder's work is not easily available now, I have taken the liberty to incorporate as much as possible of his text. I have also reproduced on a smaller scale all the plates containing illustrations of forceps, as well as all the illustrations of forceps from Kilian's Armamentarium, a work also difficult to procure.

The subject matter of the book is treated chronologically and divided into 11 sections. The first section considers the question, whether the ancients possessed any conservative instrument similar to the obstetric forceps of the Chamberlens. In my attempt to answer the question I have gone out of my way to allude to all such instruments as had been used in the pre-Chamberlen period for dealing with difficult labours, in the hope that they may interest the readers.

Section II is devoted to the Chamberlens and is a resume of Aveling's wonderful work. The third section contains as a natural sequence, the history of the forceps in Holland. The fourth section deals with the eighteenth century forceps.

The subsequent sections deal with successive periods of half or quarter centuries ending with the first 28 years of the twentieth century.

Whenever available, the inventor's own original descriptions have been reproduced. An attempt has also been made to give a short note of their life and work. Alban Doran's descriptive Catalogue of obstetric instruments in the museum of the Royal College of Surgeons of England was published in 1921. I have incorporated his descriptions of the obstetric forceps in their proper place and have given the measurements collectively in an appendix. It may be pointed out that Mulder described 44 varieties of forceps in 1793, while Schlegel, the German translator of Mulder's work, added 16. Busch and Moser mention 135 varieties up to 1838. Ratchinsky writing in the "Journal Akousherstva, etc. Dec. 1902," said that "the number has grown to over 300." In the present work over 550 varieties have been described.

Section IX gives a review of the attempts that have been made from time to time to classify forceps. Section X contains chronological lists of forceps, together with a resume of "a chronology of founders of forceps compiled by Alban Doran." In Section XI, an attempt has been made to collate and record references and illustrations regarding forceps (or founders of forceps) in Allegory, Literature and Art.

Then follows the appendix of measurements, containing Tables (1) and (2) from Mulder, Table (3) from the catalogue of the obstetric forceps exhibited at the conversazione of the Obstetrical Society of London in 1866, Table (4) compiled from Doran's descriptive catalogue of forceps in the museum of the Royal College of Surgeons of England and Table (5) from the Proceedings of the Royal Society of Medicine, vol. vi, Section, History of Medicine. The list of references forms the concluding section.

There are altogether 878 diagrams in this work. Wherever possible the illustrations of the instruments have been reproduced from their original source. Failing that I have chosen the best available diagram. I have reproduced all

the diagrams connected with the "Chamberlens" from Aveling's book. No apology is necessary for the introduction of the portraits of Hippocrates, Avicenna, Ambroise Pare, Mauriceau, Smellie, Levret, Simpson and Tarnier.

In conclusion, I must frankly confess that I am fully conscious of the defects and deficiencies of this work for which I alone am responsible. I would however earnestly appeal to obstetricians of every country who happen to come across this book to favour me with descriptions and diagrams of any of the forceps of their country to which reference has been made by me but in insufficient detail.

22, BETHUNE ROW.

KEDARNATH DAS.

Calcutta.

24th February, 1929.

Obstetric Forceps

CONTENTS.

SECTION I.

PRE-CHAMBERLEN PERIOD.

(1500 B.C.—1600 A.D.)

In a critical study of the subject of the origin of the obstetric forceps, the question that naturally suggests itself is: Was the forceps, as a conservative instrument, known before the Chamberlen period?

It would be desirable at the very outset to clearly and strictly define what is meant by "obstetric forceps." The following definition is taken from Chereau (See: Dictionnaire Encyclopedique des Sciences Medicales. Directeur. A. Dechambre. 4th Series, 3rd Vol. p. 497).

"The word forceps is said to be derived from the words *formus* hot and *capere*, to seize (*i.e.*, proper instrument for seizing hot things). Virgile (George, liv. iv, 175) describes the Cyclops as handling iron with the forceps while working at their forges at Mount Ætna. Ovid, also, mentions its use as a tool. Festus employs the word *formucapes* as a synonym for *forcipes*.

Whatever the origin of the word may be, in this historical study, we shall restrict the name of Forceps to the obstetric instrument, steadily conceived and used with its innumerable modifications of construction and shape, the main object of the instrument being to serve as a pair of tongs with two separate branches, to help in difficult labours at the same time to save the child's life."

We shall in the first instance refer to ancient writings in chronological order, with special reference to the knowledge of instrumental delivery.

(1) **The Ebers papyrus** (1550 B.C.)—the oldest known medical production—contains no indication in it as to how labours are to be managed.

(2) **Ayurveda** (Science of Life)—the ancient medical literature of India (1500 B.C.)—has the greatest significance from a medical stand-point. The most renowned representatives of this

literary monument, are Charaka, Susruta and Bagbhata. Charaka and Susruta looked upon themselves solely as elaborators of the ancient Ayurveda. Charaka is characterised by greater circumstantiality of description; Susruta by a more terse treatment of his material and a fuller consideration of surgery. In the light of recent research, Charaka probably lived about the commencement of the Christian era. It has however been suggested that the extant works represent only later editions of the originals. Some obstetric instruments are described in the ancient sanskrit works but the descriptions lack in detail. This, however is the earliest account of the accoucheur's armamentarium.

(*a*) Wise, in his "Commentary on the Hindu system of Medicine" published by Trubner & Co., London (New Issue)

FIG. 1.

FIG. 2.

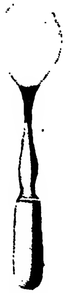


FIG. 3.

FIG. 1.—Mandalagra. Supposed form after Wise.
FIG. 2.—Mandalagra. Supposed form after Thakore Shaheb.
FIG. 3.—Mandalagra. Supposed form after Mukherjee and Sushruta.

1860, but printed originally in Calcutta in 1845, devotes a chapter on preternatural parturition (Murhagarbha). Various manipulations are recommended for delivering the child in difficult cases. "If it can not be removed, the knife is to be used. If the hand can not be so employed, the body of the infant is to be divided, and thus removed in pieces; but this is never to be done when the infant is alive, as by this operation both will be killed."

"If the dead child cannot be removed, the knife is to be used. The woman is to be encouraged with hope by kind

language and the Mandalagra (Fig. 1—5) or Ungli shastra knife is to be introduced through the vagina, the head is to be first divided and the bones are to be separated and removed. A hook is to be fixed in the orbit or cheeks and it is to be extracted. Then the hook is to be fixed in the breast, belly or axilla and the child is to be thus removed. If the infant be dead and the shoulders present first, divide them at the shoulder joint and then deliver. When the abdomen of the fœtus is much swelled, divide it, remove the intestines and extract. If the breech presents, divide the bones of the pelvis and extract. In this manner any part which impedes labour is to be divided and removed, so as to save the mother. For this purpose much care is required. As soon as the fœtus is known

FIG. 4. FIG. 5. FIG. 6.

FIG. 4.—Mandalagra. Supposed form after Mukherji and Vagbhata.
FIG. 5.—Mandalagra. Supposed form after Mukherji and Dalana.
FIG. 6.—Booreeso or hook. Supposed form after Wise.

to be dead, a skilful practitioner will lose no time in completing delivery, as the woman will die very soon, if the dead fœtus is left in the uterus. A pointed instrument should not be employed in performing this operation, as it is liable to wound the mother." It is evident from the above quotations from Wise's commentary that only two instruments—knife and hook—are mentioned and they were to be used on the dead fœtus.

The knife (*mandalagra*) belongs to the group *sotros* which have sharp cutting edges. They are in general six inches in length, of which the blade formed a half or a quarter of that length. Their supposed forms are shown in diagrams 1 to 5. It is evident that different authors have represented the same instrument in different ways owing to the fact that the description of the instruments was neither minute nor precise and thus capable of different interpretation. The Hook (booreeso) is included amongst sotros. (Fig. 6).

(*b*) Kaviraj Binod Lal Sen in his book on "Ayurveda Vijnana" or Hindu system of Medicine, compiled and translated (into Bengali) from Sanskrit treatises on medicine, surgery, chemistry, etc. (Charaka, Susruta, Atreya-Sanhita, Harita,

FIG. 7.

FIG. 8.

FIG. 9.

FIG. 7.—Garbha-Sanku. After Binod Sen.
FIG. 8.—Garbha-Sanku. After Thakore Saheb.
FIG. 9.—Garbha-Sanku. After Mukherji.

Bagbhata, Rasendra-chintamani, Rasa-ratnakar and Bhabprokas, etc.) Vol. 1. p. 218, published at Calcutta in 1879, quotes the following three slokas as referring to instruments which may be used in difficult labour. Accurate references to original texts are however not given, in this book. I find that the first two slokas are from Bagbhata, Astanga Hridaya XXV. I have failed to trace the original reference to the third sloka.

The sanskrit texts are transliterated in Roman script.

1. *Sankabah saravow tesang sorasa dadasangulow. Buhanchi fanabakrow dow dadsangulow chalane sarapunkhasa-*

baharje barisakriti. English translation. Six kinds of *Sanku* instrument are in use. Of these, two are used for separation; their ends are like the hood of a snake and they are 16 and 12 angulis long. Two other kinds of *Sanku* are used for churning purposes; their ends are like arrow-heads and they are 12 and 10 angulis long. The other two kinds which are like *fishhooks* are used for traction and extraction.

2. *Natogre sankunatulyo garbhasankuriti smrita Astagula-yatastena murhagarbha haret striya.* English translation—An instrument with a bent end like a Sanku, eight angulis long. It is used to deal with difficult labour. It is called *Garbha-Sanku.* (Figs 7—10). It will be noticed that figs. 7—10 represent the same instrument, although they vary widely in form. The reason of this apparent discrepancy is due to the original descriptions being meagre and ambiguous, and thus leading individual annotators to interpret descriptions in their own way. All these diagrams have been drawn by the annotators within very recent years. None was drawn by original authors.

3. *Sangbaddha sanku jugalo, jougnasanku prakirtita Murhagarbhahritow sopi prayojayao garbhasankuka.* English translation—"Another kind of Garbha-sanku, is used which is called "Jougma-sanku" or "paired sanku." It is like a "beri" or semi-circular ended tongs for holding hot cooking utensil. It can also be used in difficult labour." (Fig. 11).

(c) In the Journal and Text of the Buddhist Text Society of India Edited by Sarat Chandra Das, C.I.E., Vol. 11, Part 3, 1894 are published 3 plates of "Surgical instruments and appliances in Ancient India and Tibet."

Plate I, contains 22 diagrams numbered 1—20 and 55 and 56. Plate II contains 32 diagrams numbered 1—32, and Plate III contains 39 diagrams 1—39.

The same journal (p. ix) contains "A note on the illustra tions of the surgical instruments of Tibet" by Dr. Sarada Prasad Banerjee, L.M.S., who writes:—"The illustrations in Plates I, II and III give a complete idea of the means adopted for surgical operations by the native surgeons of Tibet. The drawings, though they are wanting in the perspective and

roughly drawn, can be explained with the help of the descrip tion of their use given in Tibetan."

"Like the surgical instruments of the Hindus, of which some information can be gathered from Susruta, Charaka and other works, the surgical instruments of Tibet are also named, on account of their resemblance to certain objects such as leaves, grains, millet, bills of birds, mouths of animals, etc. There are several classes of instruments such as bleeding cauterising sawing, cutting, tapping and boring apparatuses."

Dr. Banerjee then describes the uses of some of the instruments. The numbers alluded to, however, do not correspond to those in the Plates, as the following quotation shows. "No. 47 looks like a spoon with a ring shaped handle ; it is used to draw out dead fœtus or child from the womb. It is made according to the curve of the pelvis, just like the English midwifery forceps."

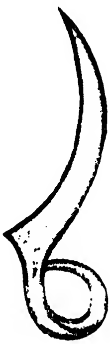


FIG. 10.

FIG. 11.

FIG. 10.—Garbha-sanku or Womb-pin. After Sarat C. Das and Pozdeniev. It is one spin long with a crooked end and is used for extraction of a dead child from the womb.

FIG. 11.—Yujna-sanku. Imaginary diagram after Binod Sen.

There is no "No. 47" in the plates. Evidently there has been some mistake in giving the number. The instrument above alluded to is apparently "No. 30" of plate II.

With regard to the same instrument, Dr. Banerjee further remarks :—"The spoon-shaped forceps used in drawing out dead

fœtus, though it is deficient in finish and style, brings their knowledge of anatomy into prominence."

Dr. Banerjee observes:—"I have tried to draw comparison of some of these with the instruments of Hindu surgery as sketched and described by Dr. Wise in his book on Hindu Medicine. The Hindu instruments are poor in their description and detail and in number. It is evident that the Tibetans acquired a higher knowledge of surgery and the operations which they did with the help of these instruments seem to have been rather elaborate. The elaborations on the handles themselves bespeak the love of the fantastic for which the Indo-Chinese nations are famous. In course of examining these plate drawings, I referred to Dr. Wise's book and the descriptions that he has given of the surgical instruments of the Hindus show that many kinds of surgical instruments existed in India although it is difficult to collect details to illustrate them. We may also conjecture that the Tibetans derived much of their knowledge, both of medicine and surgery from India. The Indian surgical instruments are also named after leaves, bills of birds and mouths of animals, etc.".

Neither the plates nor Dr. Banerjee's note indicate the source from which the illustrations have been received.

In A. Pozdeniev's Utchenie Tibetskoi Meditsinui St. Petersberg 1908, is described and illustrated an instrument called " womb-pin " (Fig. 10). It is one spin long with a crooked end and is used for extraction of a dead child from the womb. A further reference to this instrument is to be found in "Beitrage Zur kenntnis der Tibetischen Medicine, II Tiel, von Heinrich Laufer, Leipzig, 1900." For the above references I am indebted to the courtesy of Dr. Van Manen of the Asiatic Society of Bengal.

It is evident from the description and illustration that the instrument "Womb-pin" of Tibetans is sharp-pointed and sickle-shaped. The illustration has been drawn from a meagre description, just as Binod Sen did of the instrument "garva-sanku." It should be remembered that Tibetan civilization is of comparatively recent date.

(*d*) Sir Bhagabat Sing Jee in his book "The History of Aryan Medical Science" published in 1896, gives some illustrations of surgical instruments of the Hindus (see Plate VII, Fig. 7) but they are evidently based on those given in Kaviraj Binod Lal Sen's book "Ayurveda Bijnan."

(*e*) In his English translation of the Sushruta Samhita, based on original Sanskrit text published in 1907, Kaviraj Kunja Lal Bhisagratna says:—(*Vide* Introduction, page XIX) "It is in the region of practical midwifery that one becomes so much impressed with the greatness of Sushruta. The different turning, flexing, gliding movements, the application of the forceps in case of difficult labour and other obstetric operations involving the destruction and mutilation of the child, such as craniotomy were first systematically described in the Sushruta-samhita long before fillets and forceps were dreamt of in Europe and thousand of years before the "birth of Christ."

Some Illustrations are given but apparently they are copied from Binod Sen's work.

(*f*) In "The Surgical Instruments of the Hindus" by Girindranath Mukopadhya (Grifith Prize Essay for 1909), published by the Calcutta University, 1913, the following obstetric instruments are mentioned.

(1) Garbha Sanku. Fœtus or Traction Hook. (See Vol. 1, Page 165). The end of this instrument is said to have been bent like ankusa or elephant driver's goad. It is described to have the same length as the other sankus have, *i.e.*, ten to sixteen anguli and it is eight anguli in width. It is recommended for extracting a dead fœtus from the mother's womb after perforating its head by the mandalagra or mudrika knife. Sustruta recommends us to perforate the head and then to extract the bones by the sanku or hook and lastly to apply traction by fixing it about the chest or axilla. If the head can not be perforated it is to be applied to the eyes or cheeks.

(*i*) See above (*b*). Astanga Hridays Samhita I—XXV. Nathogre, etc.

(*ii*) (Sushruta samhita IV, XV). Tatra striamaswasya mandalagro nangulishastrena ba oirobidarya sinah-

kapalanyahritya sankuna gribityorasi Kakshayan bapaharedavinye chakshikute jande ba.

(2) Yujna-sanku (or so-called Midwifery forceps) (see Page 166, Vol. I). "An instrument is thus named and figured by modern writers on Hindu. Surgery bearing some resemblance to the modern forceps, for extracting the child alive. We have however no mention of any such instrument in the works of Charaka, Susrata, Bagbhata and other ancient authorities." (Fig. 11).

"Thus we may be sure that there is no available evidence of the use of delivery forceps by the Hindus, Greeks, Romans and Arabs and the Chamberlens are still the undisputed claimants to the glory of the invention."

(*g*) The author, in an address delivered before the American Gynecological Society in 1922, stated as follows regarding obstetric Instruments in Ancient India. "Only a few are described but the description of these instruments is neither minute nor precise, as they are not illustrated by drawings nor now employed. In general the name of the instrument was derived from the resemblance to certain leaves, etc. The hand is considered to be the first, the best and the most important of all surgical instruments. As some of the modern physicians have attempted to show that some of them resemble modern obstetric instruments, a few remarks will be made. (1) Mandalagra—this is supposed to resemble a decapitator. It is described as a round or circular headed cutting instrument. Wise, in 1843, gave a diagram which is something like that given by Mukherji after Susruta. Another diagram appears in an English translation of Susruta by K. Bhisagratna in 1907 which has evidently been modified by Mukherji to resemble a decapitator. The description does not warrant such assumption. Apparently it is a sharp cutting instrument which may be used for perforation. Two other instruments, *viz.*, Bridhipatra and Mudrika, are described, which could be used for similar purposes. (2) Garbhasauku is depicted by Mukherji to represent a blunt hook, but it is classified under sharp instruments. Binod Sen illustrates it as a sharp hook, which must be correct (3) Jujna-sanku means

paired sharp hooks, but it has been figured by Binod Sen to look like Palfyn's "iron hand". Sir Bhagbat Sing Jee, in his book on History of Aryan Medicine, hints that this indicates the use of forceps as a conservative instrument by the ancient Hindus. This claim has not been established. Perhaps, modern Hindu writers have been greatly carried away by their admiration for ancient Hindu medicine and in their zeal imagined that such instruments represented modern perfected types".

Critical Review.

From the above references it may be presumed that ancient Hindus possessed a kind of hook for use in difficult labours, for the extraction of dead fœtuses.

I have tried to sift all the available evidence which has been put forward to show that ancient Hindus possessed an instrument akin to the modern obstetric forceps, *viz.*, a conservative instrument for the extraction of a living child. The claim is based on the assumption that there is mention of an instrument called "Jujna-sanku". A Sanskrit couplet with its Bengali translation is given by Binod Sen in his book, but the original source of the couplet is not given by him, neither have I been able to trace the original text, although I consulted all the eminent Kabirajs of Calcutta.

It may be mentioned however, that, in the encyclopædic dictionary of the Bengali language the "Viswakosh" (edited by Babu Nagendra Nath Basu, Prachyavidya maharnaba the meaning of the word "Sanku" is given as a "pointed wooden 'pin' or nail". I also consulted that exhaustive and authoritative dictionary "Sanskrit Worterbuch" etc., published, 1875 in St. Petersburg (in the German Language) in which various meanings and applications of the word "Sanku" are given. It is apparent that the essential and primary idea conveyed by the word "Sanku" is a "Prick." They are (1) spitzer, pflock, Holznegel, (2) Hook for the extraction of dead fœtus. Sushruta 1, 92, 2. (Also Garva-sanku Vagbhata, 25, 32, (3) Stecken, (4) Blatterippe, (5) eine best Waffe, (6) Stachel.

We are therefore warranted to conclude that "Garva-sanku" is a pointed instrument intended for exerting traction by fixing on some portion of the dead fœtus, or a fœtus, the head of which has been perforated for diminution of its size. The claim of some authors quoted above, that the Garbha-sanku is a blunt hook and which can be used on a living fœtus cannot be substantiated.

Next we come to "Jujna-sanku" which merely means "jointed" or "paired" hooks, and Binod Sen has drawn a picture to make it look like Palfyn's iron hand. The description does not warrant the illustration. The authors who wrote subsequent to this, merely copy the illustration. As I said elsewhere, Modern Hindu writers have been greatly carried away by their admiration for ancient Hindu medicine and in their zeal imagined that the instrument (Jujna-sanku) represented a perfected type of the modern forceps.

Recently, at a personal interview, Dr. Mukherji, the author of "Surgical instruments of the Hindus," expressed the opinion that he now believes that the ancient Hindus did possess an instrument which could be used on a living fœtus when labour was difficult, contrary to his former published opinion. He bases this change of his opinion on two factors.

(1) That "Garbha-sanku" is a blunt instrument. In this view I do not concur and I think I have conclusively proved that this instrument is "sharp" and not blunt, (2) that the illustration of Thibetan instruments for helping delivery possesses a curve according to the curve of the pelvis. The instrument depicted has got a curve but the extremity is pointed. Mukherji has evidently accepted the description of Banerji. The description is very vague and far from accurate. Pozdeniev, describes the same instrument as a "womb-pin" used for the delivery of a dead fœtus.

From the evidence collected so far, we cannot escape the conclusion that the ancient Hindus never had an instrument like the modern obstetric forceps.

(3) **Hippocratic Writings (400 B. C.)**—Hippocrates was not an obstetrician but there are indications in his writings of his genuine interest in the disorders of females. In the

FIG. 12.—Hippocrates.
A composite portrait designed from a study of ancient medals and coins by the Swiss artist, the late Albert Anker.
(From Cumston's History of Medicine).

Hippocratic writings that are supposed to be products of his followers, some obstetric subjects are fully dealt with, as for example how an unfavourable lie of the infant can be changed into a favourable one. It is only with cases where the child is already dead that advice and instructions are given as to how to deal with it by mutilating and extracting it. Hippocrates possessed a compresser, an ecraseur and also an instrument called "máchaire" for extracting the child from the mother's womb. Soranus of Ephesus, who seems to have been a contemporary with Galen, describes not less than seven instruments for using in embryotomy: *viz.* (1) a blunt, curved crotchet, (2) a scalpel for opening the head of the child, (3) a dentated forceps, (4) forceps for breaking the bones, (5) instrument for extracting fragments of bones, (6) pointed knife for perforating the skull and to empty it and (7) a scalpel for dissecting the head. The following passage in Soranus shows that it was customary also to insert a second hook opposite the first and to make traction on both at the same time.

The best places for the insertion of the hooks are in head presentations, the eyes, the occiput and the mouth, the clavicles and the parts about the ribs. In footling cases, the pubes, ribs, and the clavicles, are the best. Warm oil having been applied as a lubricant, the hook is to be held in the right hand ; the curvature concealed in the left hand is to be carefully introduced into the uterus, and plunged into some of the places mentioned, till it pierces right through to the hollow part beneath. Then a second one is to be put in opposite to it in order that the pulling may be straight and not one sided" (Milne. "Surgical Instruments in Greek and Roman times" p. 153). (Voy. J. Pinoff. Artis obstetriciæ Sorani Ephesii detrina......Vratisalriæ 1841 in—8). Celsus (*vide,* edit. de M. A. Vedrines, Paris 1876 in 8 lib VII Cap. XXIX.) has an interesting chapter on the removal of the fœtus in difficult labour. He suggested rules for effecting delivery either by means of version (cephalic or podalic) or by the help of a hook called "uncus." With regard to the latter he says (VII, XXIX): "Then if the head presents there ought to be inserted a hook, smooth all round, with a short point which is properly fixed in the eye,

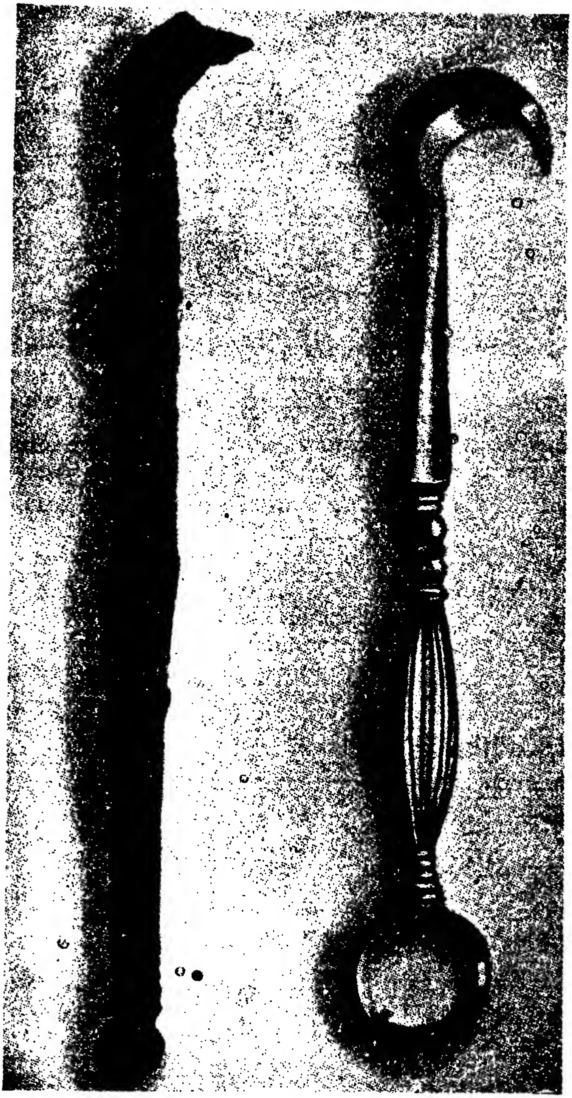


FIG. 13. FIG. 14.

FIG. 13.—Traction hook for embryo from Pompeii in the Naples Museum. Size 17 cm. (Milne Plate L, 1).

FIG. 14.—Ring Knife in the Naples Museum after Vedrènes (Milne; Plate L, 2).

or the ear or the mouth, sometimes even the forehead, which being drawn on extracts the child. Nor is it to be drawn on without regard to circumstance. For if the attempt is made with an undilated cervix, not getting exit the fœtus is broken up, and the point of the hook, catches on the cervix and inflammation follows and much danger of death. Therefore, it is necessary with a contracted cervix to wait quietly, with a dilated one to make gentle traction, and during these times to extract it gradually. The right hand ought to make the traction on the hook, the left placed inside to draw the child and at the same time to direct it." One of these hooks has actually been found in Pompeii which has been illustrated by M. Vedrenes (Fig. 13). It is made of steel with handles of bronze. It is preserved in the Naples Museum. Attention may also be drawn to a ring knife in the Naples Museum (see Fig. 14).

(4) **Aëtius and Paul of Egine** (edit. de 1565 in fol.t. II p. 582, 790, etc.) employed two hooks, "uncinii attracterii," which were introduced separately in the genital canal of the woman and strongly grasped the child's head on two opposite points. This was perhaps the primary idea of forceps as representing two artificial hands and approached the ideal of modern forceps, with the exception of the articulation. These two authors also mention of a "Forceps dentarium aut Ossarium," to practice embryotomy.

To the Greeks is due the distinguished glory of having conveyed in their own language, the rudiments not only of medicine but of almost every art and science to all the western world. It is probable that the Greeks were instructed by the Egyptians and the Egyptians in turn by the Hindus.

Milne, in his work on the "Surgical Instruments in Greek and Roman Times" published at the Clarendon Press, Oxford, 1907 asks himself "Had the Greeks and Romans, a forceps for extracting the child alive? His answer is "Probably not". The following quotation from his work will show how he comes to that conclusion.

"We have no mention of any such instrument by Soranus or Paul, both accomplished obstetricians, nor can any descrip-

FIG. 15.—Pompeian forceps in the Naples Museum. (After Milne, Plate XLIII). Size of original 21 cm.

tion of such an instrument be found in the voluminous pseudo-Hippocratic works on women. Adams, in a note to Paul III, LXXVI, says that though the Roman and Greek writers do not mention the forceps, Avicenna does so. "When delivery is difficult owing to the size of the child, he directs us to apply a fillet round the child's head and endeavour to extract it. When this does not succeed the forceps are to be applied and the chld extracted by them. If this can not be accomplished, the child is to be extracted by incision as in the case of a dead foetus. This passage puts it beyond doubt that the Arabians were acquainted with the method of extracting the child alive by the forceps".

Milne in commenting on this says: "This is, however, not quite correct. A full consideration of Avicenna's words seems to me to lead to the conclusion that he is describing no more than extraction with a craniotomy forceps. If the forceps fail the chilld is to be extracted by incision as in the case of a foetus already dead (and decomposed so that the forceps would not hold).

Neuberger also does not believe that the forceps, referred to, by Avicenna was the conservative instrument for the extraction of a living child. He observes that the forceps "are not however further described. The manner in which this is recommended by Avicenna leaves it doubtful whether this refers to dead or living children".

Further on Adams says, "From the sketch which we have given above, it will be seen that the Arabians have made mention of the forceps; but that most probably the Greeks and Romans were unacquainted with this instrument, as far, at least, as appears from their works on medicine which have come down to us. It is deserving of remark, however, that in the house of an obstetrix which has been excavated in Pompeii, there was found an instrument of art bearing a very considerable resemblance to the modern forceps".

"As regards Adams's statement that a forceps like ours was dug up in Pompeii," Milne asks, "Where is that forceps now? It is certainly not in the Naples Museum, where all the finds from Herculaneum and Pompeii have been stored

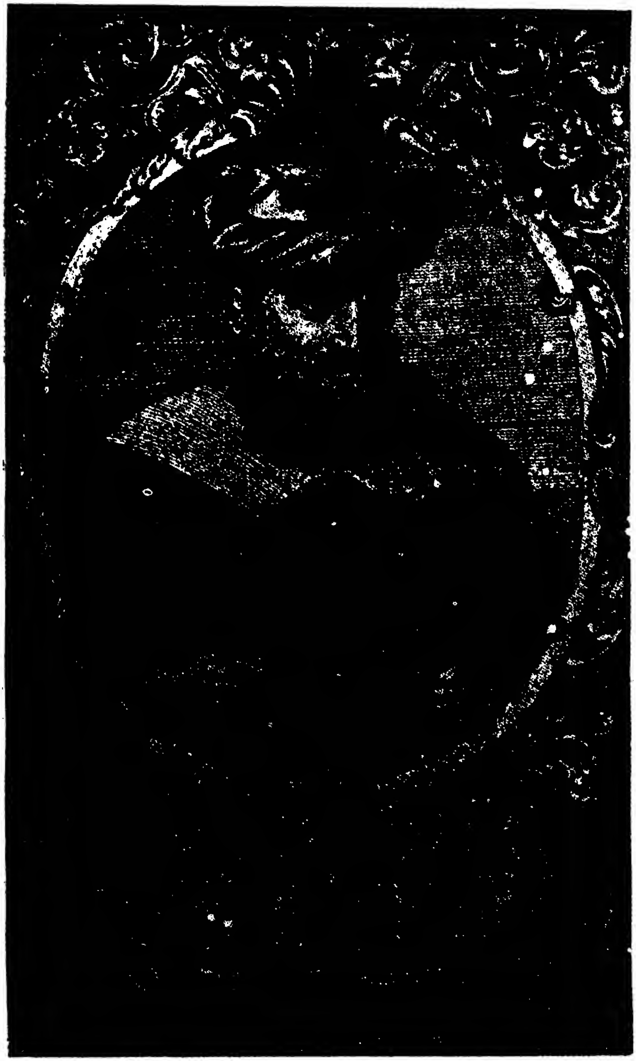


FIG. 16.
Avicenna (980—1030 A. D.).
(From Johns Hopkins Hospital Bulletin).

since the excavations were commenced. Adams has probably been misled by some notice of the "Pompeian forceps" (Fig. 15), which many consider adapted for removing the cranial bones when the child's head is broken up in cephalotripsy. It, is however, a sequestrum forceps.

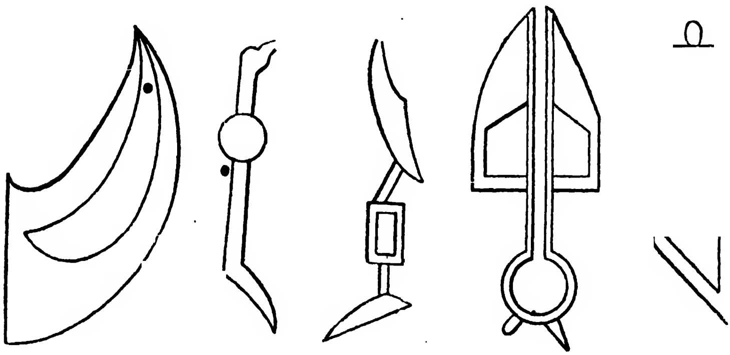


FIG. 17—21.—Different instruments of ancients for cutting the fœtus from Albucasis. (From Witkowski).

Milne goes on to say:—"The only passage I have met with in the slightest degree supporting the notion that the ancients ever delivered the child alive with instruments is one in the pseudo-Hippocratic treatise "De Superfaetatione," where we are told that,

'If the woman has a difficullt labour, and the child delay long in the passage and be born not easily but with difficullty and with the mechanical *aids* of the physicians, such children are of weak vitality and the umbilical cord should not be cut till they make water or sneeze or cry' (i, 465).

We are not entitled to translate *"aids"* by "instruments" because it may mean any mechanical aid such as a fillet or even assistance with the fingers of the accoucheur; but, even granting that it refers to instruments, it might mean no more than, *e.g.*, the embyo hooks. With them, terrible as they were, the child must frequently have been born alive, though mutilated. A child would have had far better chance of being born alive with them than with the murderously toothed forceps of Albucassis.

(5) **Avicenna** a celebrated Arabian obstetrician, born A.D. 980 at Bokhara, and died A.D. 1030, described in the eleventh century the management of difficult labours due to big size of the fœtus and recommended as a last resort, the forceps. (*Vide* edit de 1608 in-fol. t. 1 er p. 942).

FIG. 22.

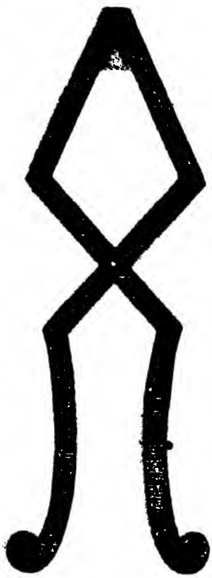


FIG. 23.

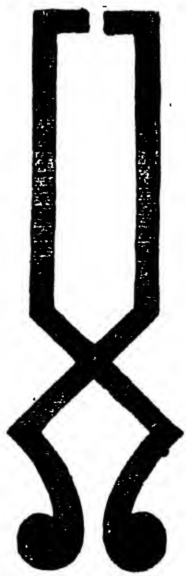


FIG. 24.

FIG 25.

FIG. 22.—The Almisdach of Albucasis with which he crushed and extracted a large head.

(*N.B.*—The misdach was of the same shape but not so large).

FIG. 23.—Forfex Albucasis. With teeth to crush the child's head.

FIG. 24.—Vertigo Albucasis. With which he opened the matrix.

FIG. 25.—Embryotome of Albucasis for perforating the fœtal head.

It appears from a passage in Avicenna's book that his forceps could bring forth a child alive but if it was thought that such a result could not be obtained, he advised extraction of the child by mutilating it, considering it to be dead.

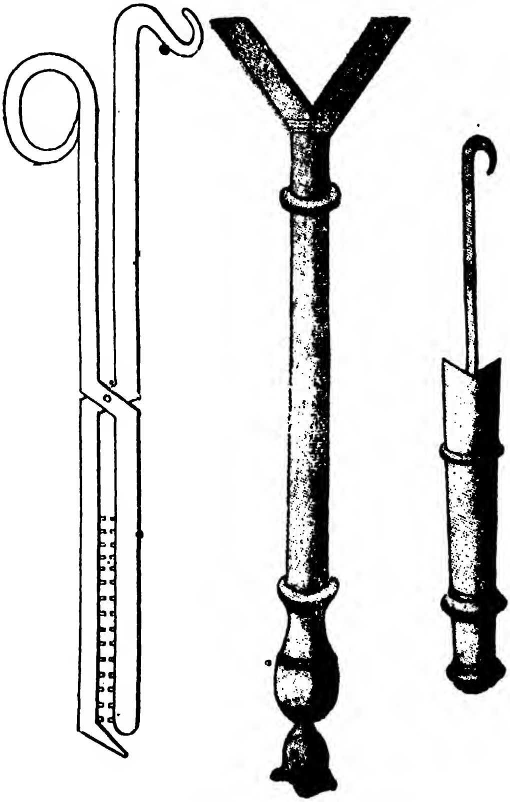


Fig. 26. Fig. 27. Fig. 28. Fig. 29.

Fig. 26.—Forceps for crushing and extracting the fœtus (Albucasis).
Fig. 27.—Impelleus. To push up the fœtus in the womb (Albucasis).
Fig. 28.—Forma Uncini (Albucasis) with only one hook.
Fig. 29.—Another form with two hooks (Albucasis).

(6) **Albucasis** was born at Zahra near Cordova, in 936 A.D. and his death occurred in 1013 A.D. He described and depicted several obstetric instruments (See Figs. 17—35). It will be

easily seen, by looking at the diagrams that these instruments could not be used on a living child. (*vide* Albucasis "Altasriff" (or "collection") of which the surgical part survives in Channing's Arabic text (Oxford, Clarendon Press, 1778). It is remarkable as containing the first pictorial representations of surgical instruments, (See also edit de 1541 in fol. lib. II Chap. LXXVII).

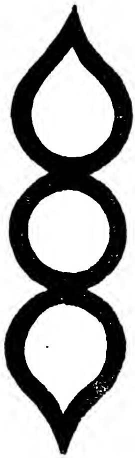


FIG. 30. FIG. 31.

FIG. 30.—Forma Spatumilis Albucasis, being sharp at both ends for opening the child's head and breaking the substance of the brain.

FIG. 31.—Another of the same person for the like purpose.

(7) **A. Pare** (*Vide*—Collection de l' administration' anatomique 1549 in 8^{O}) described and illustrated three crochets, of which one is a kind of fork, with two long pointed teeth bent back in the middle, and the other two were blunt, curved and a little wide. These three crochets were used to extract a dead child which had remained in the passage. (See Figs. 37,38 and 39). Pare also described other instruments. (See Figs. 40—47).

(8) **Euchar Rhodion,** in 1552, advised the use of various drugs in difficult labours and when these failed, the use of instruments (hooks, forceps, etc.) to extract a dead child. These instruments had to be inserted into an eye, in the palate under the chin, or under the armpit of the child. (*Vide*—De Partu Hominis in 12°-fol·38).

(9) **Jacques Rueff** of Zeurich, in 1554, (*Vide*—De conceptu et generatione hominis. Franc 1554, in 8°, 1580 4° invented amongst other instruments his "Forceps longa et

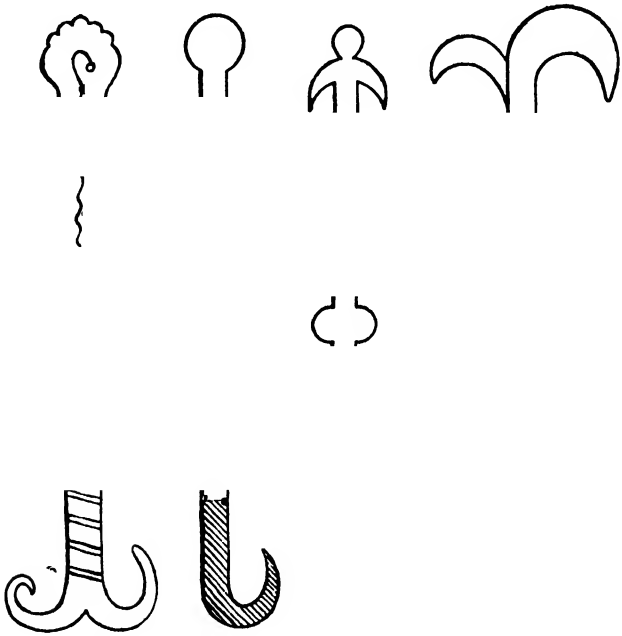


FIG. 32—35.—Crochets employed by Arabian Surgeons, after Albucasis. (From Witkowski).

tersa," with the declared intention of delivering a living child. This was the first expression of inoffensive and conservative function of the forceps. It will be observed, that Rueff's forceps possessed in an undeveloped form the essential characters of the modern instrument. Rueff's illustration of his forceps does not however give the exact dimensions, it being stated that the instrument was 14 centimetres long, 7 for the blades

FIG 36.
Ambroise Pare.

and 7 for the handles. Evidently such measurements were insufficient for practical use. Ingerslev states "perhaps it was used for removing stones from the bladder". (See Fig. 49).

Rueff described two other obstetric instruments. (See Figs 50 and 51).

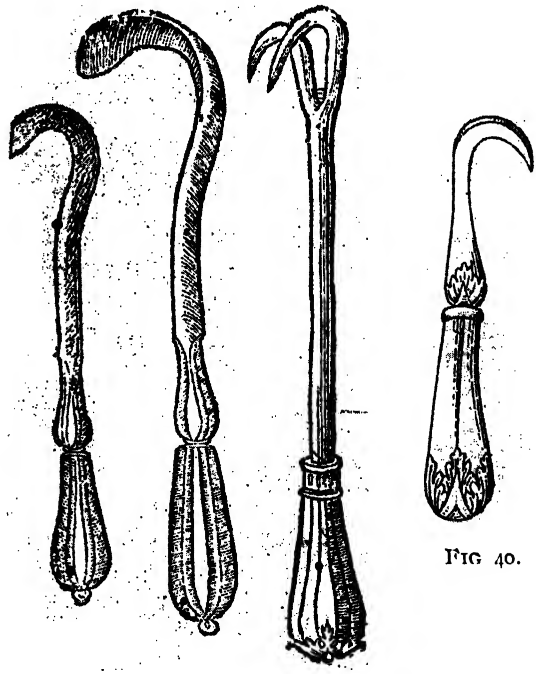


FIG 40.

FIG. 37. FIG. 38. FIG. 39.

FIG. 37—39.—Crochets employed in the time of Ambroise Pare.

FIG. 40.—Small curved knife for splitting open the abdomen and head of a dead child in the uterus. (Ambroise Pare).

(10) **Pierre Franco** of Turrieres. (Traite des hernies, Lyon 1561 in 8°) described in detail and illustrated an instrument which he designated speculum matricis. (See Figs. 52—59) This instrument may be considered as a real, head tractor and represents fairly well, except for its dimensions, the three-valved instrument of the present day. These three valves were from 10 to 12 fingers long and could easily be made to

diverge and converge by means of a handle located at the fower part. The instrument, being self-closing, was introduced into the vagina down to the lvel of the child's head or into the cervix uteri, if the head has not emerged through it. In manipulating the handle, the valves separated considerably, quite enough for the operator to slip in his hand, to enable him to easily place the child's head between the valves. By working the handle, the valves reclosed and grasped the child's head which could then be extracted by traction on the instrument. Chereau is of opinion that the ingeniousness of this instrument has not been duly recognised and the inventor of this instrument has not received the credit due to him.

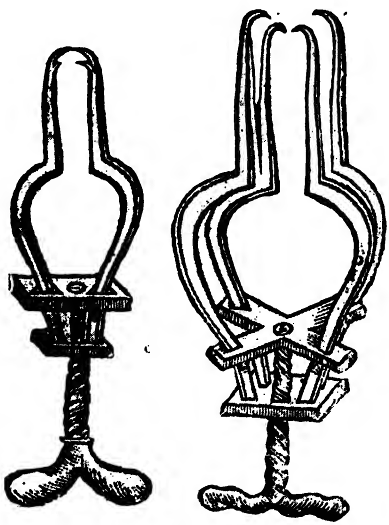


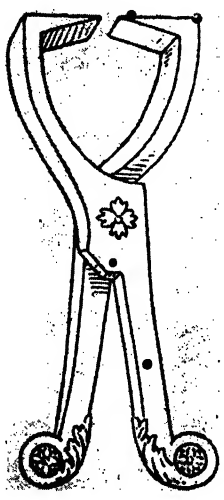
FIG. 41. FIG. 42.

FIG. 41.—Pes Gryphii of Ambroise Pare, to extract the child's head when left alone in the uterus.
FIG. 42.—Another Pes Gryphii of Ambroise Pare, of the same shape as fig. 41 but with four branches.

The Loan Collection, the property of the Royal Society of Medicine, deposited in the Museum of the College of Surgeons, possesses a sixteenth century "Speculum Matricis," in design one of the most ancient of all surgical instruments. A dilator

or speculum of the same type was found amidst the ruins of Pompeii and is preserved in Naples, and a similar three-bladed instrument was certainly in use in mediæval Europe, for it was well-known as a rectal or vaginal dilator to at least one Surgeon, Gersdorff, who was in practice at the end of the fifteenth century.

This speculum matricis (Fig. 52) is thus described in the Catalogue and Report of Obstetrical and other Instruments exhibited at the Conversazione of the Obstetrical Society of



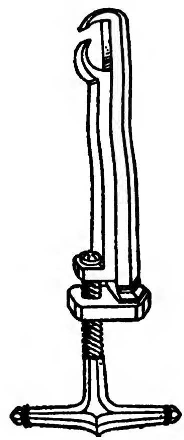
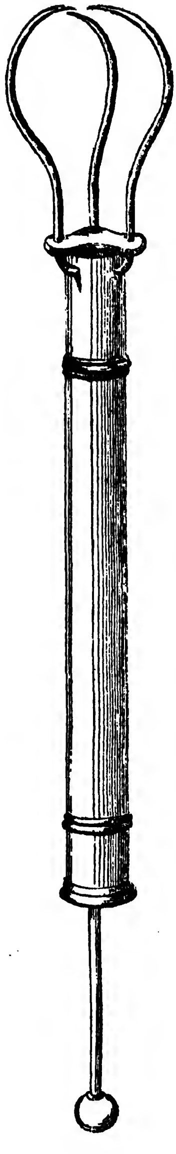


FIG. 43. FIG. 44. FIG. 45.

FIG. 43.—Nipper of A. Pare for cutting the bones of the fœtus.
FIG. 44.—Tongs of A. Pare for the same purpose.
FIG. 45.—Another tongs of A. Pare.

London, held, by permission, at the Royal College of Physicians, March 28th, 1866, p. 195:—

"A very curious variety of the tri-valve speculum, exhibited by Professor Breslau of Zurich. It is one of the terrible but historically curious specimens described and illustrated in the



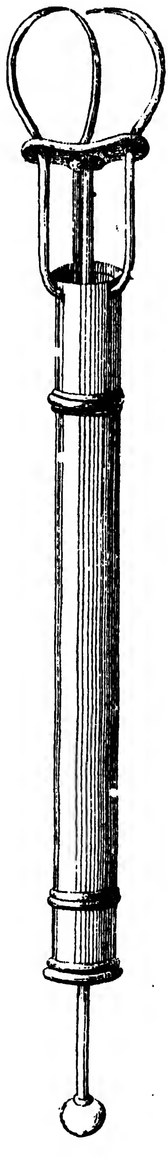


FIG 46. FIG. 47.

FIG. 46.—Extractor of Ambroise Pare which he calls Pes Gryphii from its resemblance to the foot of griffin. It is used to extract moles. (Open).
FIG. 47.—The same closed.

now rare work of F. (sic) Rueff: 'Ein schon lustig Trostbuchle von den empfengknussen und geburten der menschen vnnd jren vilfaltigen zufalen und verhindernussen,' Zurich 1554. Rueff lived in Zurich in the middle of the sixteenth century, and his book, translated into several languages, was one of the first concerning the obstetrical art.

"The blades of this instrument are pointed, three inches long, and spring at right angles from the handle, which is heart-shaped and has a long screw running through its centre; this screw, attached to the blades, is turned by another handle

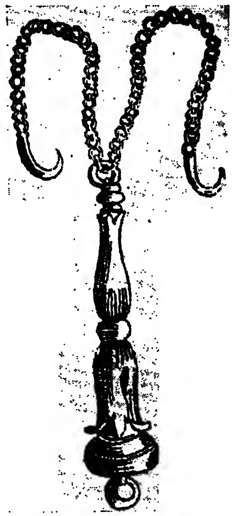


FIG. 48.

FIG. 48.—Double crochet with chains, of ancients, according to Andre De La Croix (Witkowski).

similar in construction and movement to those used in the common street organs. Dr. Breslau writes to us as follows:—

" 'Eight years ago I bought this iron instrument from an antiquary who had received it as a legacy from a physician, and I believe, judging from its form and construction, that it is an original one. I should be most happy if the Obstetrical Society of London would not only take an interest in this

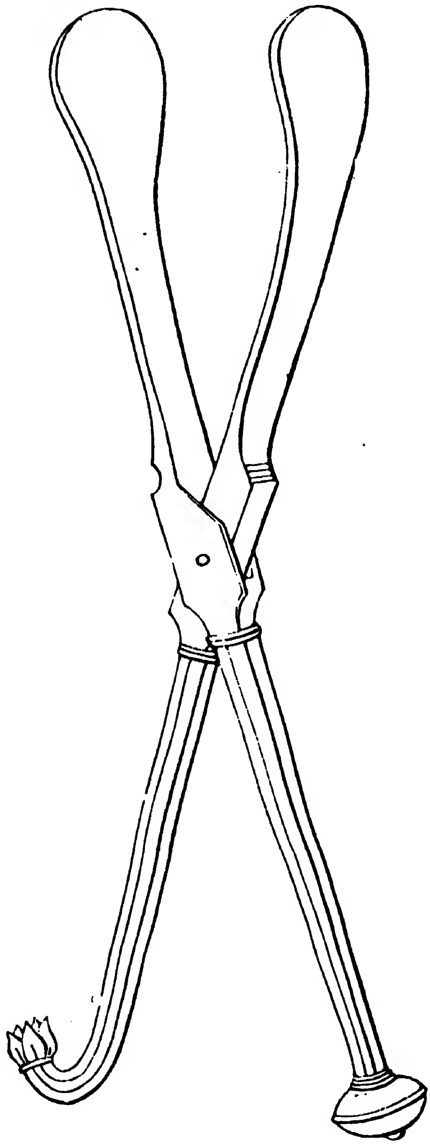


FIG. 49

FIG. 49.—Forceps longa et tersa of Rueff. (Mulder)

specimen of mediæval obstetric cruelty, but more if they deem it worthy of a place in their collection.' The instrument is accordingly in our museum." The speculum is not figured, and nothing further is said about it.

Doran* gives the following description of this Loan Collection speculum matricis. "The speculum weighs fourteen ounces, or nearly four hundred grammes, and is made of steel apparently hand-forged and finished. It measures $7\frac{1}{2}$ inches (19 cm.) in length. It bears three blades, each $3\frac{1}{4}$ in. (8.2 cm.) long, convex

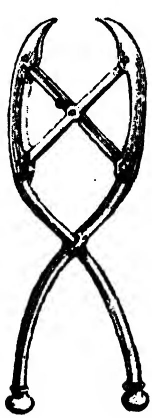


FIG. 50.

FIG. 51.

FIG. 50.—A pertorium of Rueff. (From Witkowski).
"A large cross-bladed dilator. The blades are convex externally and two hinged bars, crossing each other X-wise, connect their inner surfaces, acting like the spring in more modern dilators". (Doran).

FIG. 51.—Rostrum Anatis of Rueff. For removing a dead fœtus. (Witkowski).

on its outer surface, and tapering to a somewhat sharp point. The inner surfaces are prism-shaped, so that all three blades may be brought into perfect apposition when closed, and made firm, fit in fact for introduction into the vagina. Each of the two lateral blades stands at right angles to a flat side-bar with

*Journal of Obstetrics and Gynaecology of the British Empire Vol. XXVI p. 130.

which it is continuous. Each bar curves outwards and then downwards, making a wide curve, to join its fellow below, where they are united by a single or pin joint. The two form a shoulder about 3½ inches (8-9 cm.) broad when the blades are

FIG. 52.—Speculum Matricis in the Museum of the College of Surgeons and described in the Obstetrical Society's Catalogue (1867), p. 195. This is more precisely described by Doran in J. O. G. Br. Em. Vol. XXVI, p. 132.

closed, and give a pear-shaped outline to the instrument. The third, middle, or lower blade is continued into a flat cross-shaped piece of steel to which it stands at right angles. The cross-bar forms a pair of wings looped so as to travel over the outside

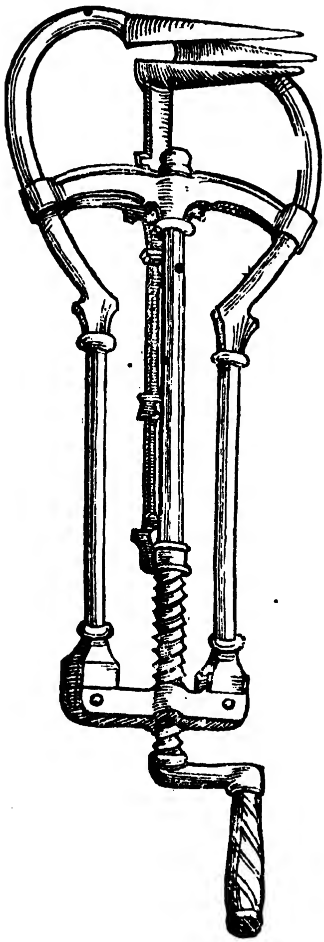


Fig. 53.

Fig. 54.

Fig. 53.—Speculum Matricis—Rueff. From "De Conceptu et Generatione Hominis", 1554. (Doran).
Fig. 54.—The Pompeian Speculum. (Doran).

curved bars. To the vertical bar of the cross, two bearings are affixed, the upper to receive the revolving head of the screw, the lower to carry the female screw. A third bearing, resembling the second, is fixed on the joint uniting the outside bars below. A male screw passes through these several bearings and is worked by a winch, the shaft of which is $1\frac{3}{4}$ inches (4.4 cm.) and the handle $2\frac{3}{4}$ inches (7 cm.) long, so that the blades may be opened or closed as desired.

The evidence that this sample in the Loan Collection is of great age and not a modern model, is strong. It is hand forged, and another apparent proof of its antiquity is the polish of its surface, especially in the inner border of the lateral bars, which indicates that the smoothing of the metal was done by rough stone and not by the more modern file."

This kind of speculum is generally known as Rueff's (See Fig. 53). An instrument, practically identical in its mechanism was in use among the Romans, *i.e.*, "The Pompeian Speculum," (See Fig. 54).

"Thus, the use of a bladed expansible instrument is recorded in the works of ancient authorities. When we turn to the middle ages, we find that Guy de Chauliac in his "Grande Chirurgie" of 1363, in writing of the extraction of the child, directs the surgeon to "introduce the instrument called Speculum which is provided with a thumbscrew, and dilate the vagina as much as possible." No doubt de Chauliac is speaking of the same instrument, the thumbscrew, instead of the winch, being a mere modification, known, as will be explained, to Pare. It will be shown that Gersdorff published a drawing of this speculum matricis in 1526, twenty-eight years before Rueff's work appeared, and notes distinctly that it was used as an anal or vaginal dilator.

There can be no doubt that the three-bladed Pompeian speculum is the ancestor of Rueff's. The blades are more convex externally and become somewhat narrower towards the lower and more cylindrical portion. The upper, free ends, or points of the blades are very blunt, a great deal blunter than the blades in the Loan Collection sample and in the instruments figured by Gersdorff and Rueff. Thus the ancient Romans finished the

blades better than the Europeans of the Renaissance; as may be seen at a glance (Fig. 54) the blades in the Pompeian speculum would be much less likely to wound or irritate the parts. In one important feature the Pompeian speculum resembles fig. 52, the Loan Collection instrument, for in both the blades are prismatic, whilst in Gersdorff's and Rueff's they are concave internally. It would have been better had the points been made as blunt in the sample to be seen in the College Museum as in the Roman prototype, but the return to the prismatic type of blade was a good idea.

The two lateral blades in the Pompeian speculum stand at right angles to a flat side bar with which they are continuous. The two bars running outwards, slightly curved with the convexity forwards form a shoulder 2½ inches or 6.3 cm. broad when the blades are closed. Below the shoulder they turn very sharply downwards, running for over four inches bowed inwards, so as to be within half an inch from each other in the middle of their course. At their extremities they turn inwards and are united to each other by a round hinge-joint about ½ inch (1.2 cm.) in diameter. A rod passes through the hinge and is secured by a linchpin on the upper surface. This rod has a very broad conical head, projecting from the under surface and bearing a female screw.

The middle blade stands at right angles to a stout cross-bar 2½ inches (6.3 cm.) long, with which it is continuous. The cross-bar bears a slot in each side so that it may travel over the side bars. There is a bearing on the under side of this cross-bar, for a female screw.

The male screw is worked by a simple cross-bar handle 1½ inches (3.8 cm.) wide. It passes through the head of the rod at the hinge and through the bearing on the cross-bar, above which it ends secured by a metal cap.

Thus the male screw lies on the under surface of the speculum in the Pompeian instrument, but on the upper surface in the Loan Collection and many other Renaissance specula, though in a few sixteenth century instruments the screw runs below as in the Roman prototype. There remains, however, a special feature in the Pompeian speculum. Two flat bars, 3½

inches (8.9 cm.) long, and convex externally, are prolonged below the side bars, each attached to the corresponding side bar by a hinge-joint. Thus they can be pushed outwards, out of the way when the screw is being turned and then pressed inwards so as to meet close above the handle of the screw; this arrangement allows the speculum to be firmly grasped."

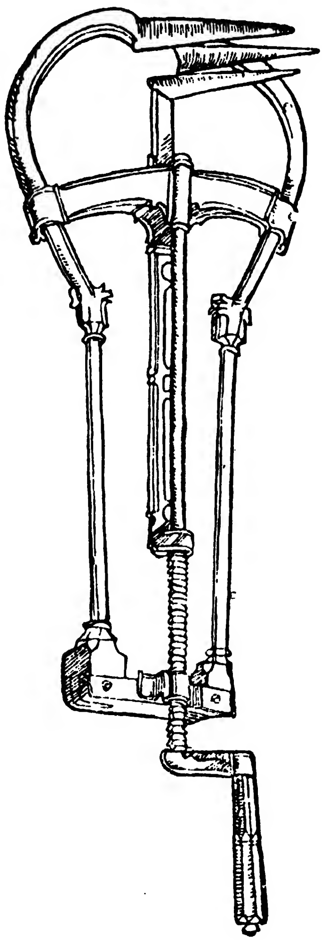


FIG. 55.—Speculum that is—to open the anus or the birth parts of women. Gersdorff. From "Feldtbuch der Wundartzney", 1526. (Doran).

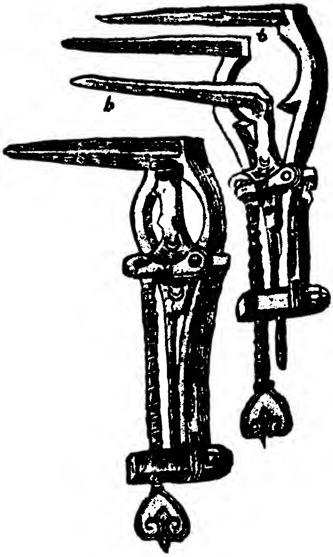
Rueff does not claim to be the inventor of the speculum matricis which he figures and which has been associated with his name ever since 1554. We find a drawing (Fig. 55) of a very similar though not identical instrument in Gersdorff's "Feldtbuch der Wundartzney," published in 1526. On page 57 we find the familiar speculum Matrices represented in a woodcut which we reproduce (Fig. 50). The instrument, in fact, is represented by Gersdorff as a rectal speculum, though the author notes that it could be employed in obstetrics, a subject which is not included in the "Feldtbuch."

Doran does not reproduce the passages on the use of this speculum matricis in Rueff's original Latin, as it is literally translated in "The Expert Midwife or An Excellent and most necessary Treatise ot the generation and birth of Man........ Compiled in Latine by the industry of James Rueff; a learned and expert Chirurgion and now translated into English for the general good and benefit to this Nation. London. Printed by E. G. for S.B., and are to be sold by Thomas Alchorn at the signe of the Greene Dragon in Saint Paul's Church yard, 1637".

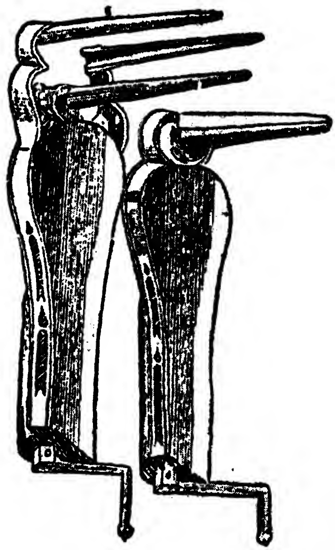
The speculum is to be used when "children stricking in the wombe and being dead, are to be brought forth." First potions, suffumigations, plasters and a medicated pessary are to be tried (pp. 98-103).

"But after all these things being used, but especially, if the Midwife shall not be able to make way and passage for the Infant, the parts of the Matrix being enlarged and amplified as they should, Instruments wholly fit and profitable for those uses shall be used. And when as necessity shall require the use of them, the poore and distressed labouring woman must be encouraged beforehand with comfortable and cheerful words, then the Instruments are to be prepared, and devout prayer to be poured forth to God: and that done, let her so sit upon the Stoole, that shee may turn her Fundament as much as shee can to the backe of the Stoole, and draw her legges to her as shee may, and spread and separate them as wide as shee can, the other women standing by, helping and furthering her, that the Midwife may conveniently perform and execute that which is to be done with the Instruments. But if another way shall

please, and seeme more commodious to the Midwife, let her bring the woman to her bed, in which let her lie, her head declining and bending backeward a little, but her buttockes lifted somewhat higher than all the rest, and her legges drawne unto her so much as may be. Then with either of these Instruments, which shall please best, being annointed, let the Midwife begin to worke, and to proceed forward. For both these hereafter described and setforth are prepared to open, enlarge, and bring forth.



FIGS. 56, 57.



FIGS. 58, 59

FIGS. 56, 57.—Speculum Matricis employed in the time of A. Pare (open and close). (Witkowski affirms that "Franco represented in his edition of 1561 an analogous speculum and recommended its use for the extraction of after-birth").

FIGS. 58, 59.—Speculum Matricis. Employed in the time of A. Pare. Another form (open and close). (Witkowski).

"Let the Midwife gently direct and convey one of these Instruments, that is, the Instrument named in Latine, Apertorium, the opening Instrument, being annointed and closed together by the necke of the Matrix into the inward port or gate, which being sufficiently done, let her close together the

instrument with both her hands at the lower end of it, until she have enlarged the mouth of the Matrix as much as sufficeth. Or, if it please, let her use the other Instrument, named in Latine, Speculum Matricis, the Looking-glasse of the Matrix, after the same manner as was said even now of the other Instrument called Apertorium. But in this Instrument named Speculum Matricis, the turning joynt must be turned so often about, till you shall understand it sufficeth for dilatation and enlarging of those parts. And the Orifice or entrance of the

FIG. 60.—F. Mauriceau (? 1709).

Matrix being enlarged by that meanes, let the Midwife take hold of the Infant gently with her hands, and if it be possible, bring him forth with the Secundines. After let her wash and annoint the womb of the delivered woman, and let her bring her to her bed, being delivered of the birth, and refresh and comfort her with sweet spices, and also with convenient meat and drinke." All dead children, retained membranes and placenal tissue, and moles require "the same manner of proceeding." Should the midwife fail, then the dead fœtus must be removed

with the "Rostrum anatis, the Ducke or Drakes-bil," or "the Paire of Pinsers with which teeth are pulled out," or else "the Forceps longa et tersa, the long and smooth Pinsers or Tongs." The last observations and the drawings of the Rostrum anatis and the forceps longa et tersa are, like the remainder, reproduced literally from Rueff's Latin edition in the English transation which was written in 1637, when Chamberlen's "saving" forceps was probably in use.

The above passages have been quoted in full to show that Rueff completely amended Rosslin's chapter on the extraction of the retained dead foetus, from the middle part beginning

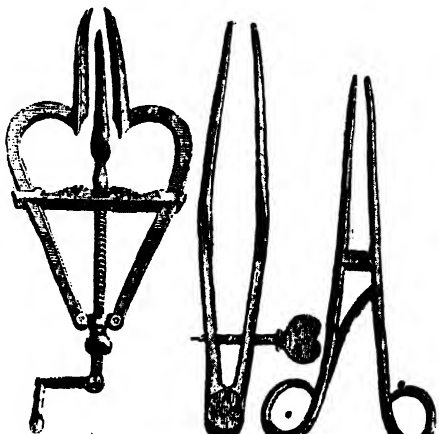


FIG. 61—63.—Dilators with two and three branches employed in the time of Mauriceau.

"ob solch artzney" and "Caeterum post omnia haec adhibita." It seems strange that Rosslin does not mention the speculum matricis, which was known in 1515 when his "Rosegarten" was published.

After Franco, there had been a stoppage in the progress of the history of the obstetric forceps. Although the technique of podalic version improved considerably, no proper tractor was invented for the purpose of extracting the child alive. In urgent cases, they had recourse to hooks which invariably killed the child. In 1743 Voight published a catalogue of these hooks.

One may go so far as to use a large common Kitchen spoon or as it happened in the case, above all of 'Franche-Comte' a crochet of a Daniel's balance or a steelyard, to remove a fœtal head severed from the trunk and left in the uterus. (Louise Bourgois, Observations 1606, p. 45 ; Paul Portal, La pratique des accochement p, 101.)

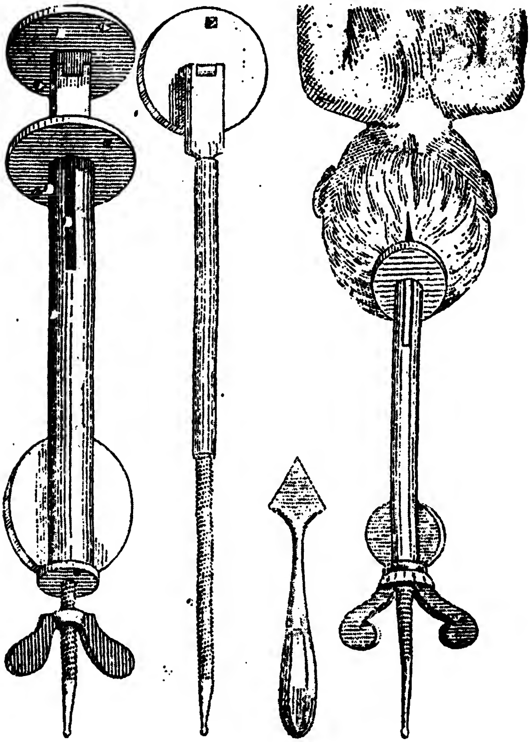


FIG. 65. FIG. 66. FIG. 67. FIG. 68.

FIG. 65.—Tire-tete of Mauriceau.
FIG. 66.—Tire-tete Inner portion shown separately.
FIG. 67.—Perforator of Mauriceau.
FIG. 68.—Tire-tete applied to the fœtal head.

Several accoucheurs strongly commented on the use of these "horrible, execrable cruel" crochets, admitting at the same time that they could not suggest any other means of delivering those unfortunate women.

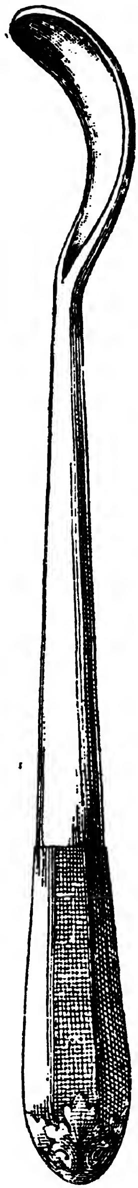
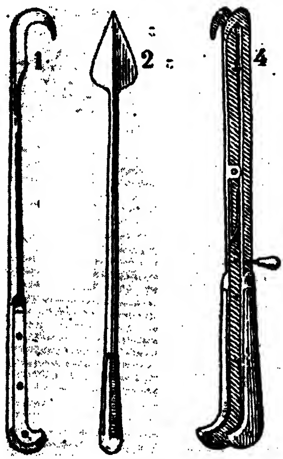


FIG. 64.—Blunt hook of Mauriceau after Kilian.

F **Rosset** (Cæsaric partus assertic historiologica, 1590 feeling similarly helpless advocated hysterotomy. **Mauriceau** (Fig. 61-70), (Malad. des femmes, 1668, in-4°), **D. Fournier** (L'accoucheur methodique, 1677 in-20° and **Peu** (Fig. 71-73) (La Pratique des accouch. 1694 in-8°) described different forms of crochets for extracting the head. D. Fournier's instrument was denatated, like the jaw-bone of shark. The



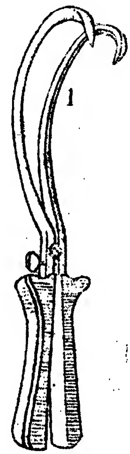


FIG. 69. FIG. 70. FIG. 71. FIG. 72. FIG. 73.

FIG. 69.—Crochet of Mauriceau (Witkowski).
FIG. 70.—Perforator of Mauriceau (Witkowski).
FIG. 71.—Crochet of Peu (Witkowski).
FIG. 72.—Crochets of Peu (Kilian).
FIG. 73.—Hook of Peu (Witkowski).

tire-tete of Mauriceau is composed oft woo round plates life of the child is sacrificed. Mauriceau, imitating **Amand** (Fig. 74-76) proposed a bandange slipped over the fœtal head for extracting the child. **Dionis** (Traite gen. des accouch. in-8° liv III chap, 14,26.) in 1718, declared that science possessed three possible ways of delivering the child by force, *viz.*, the crochet, the removal of the brain matter of the child

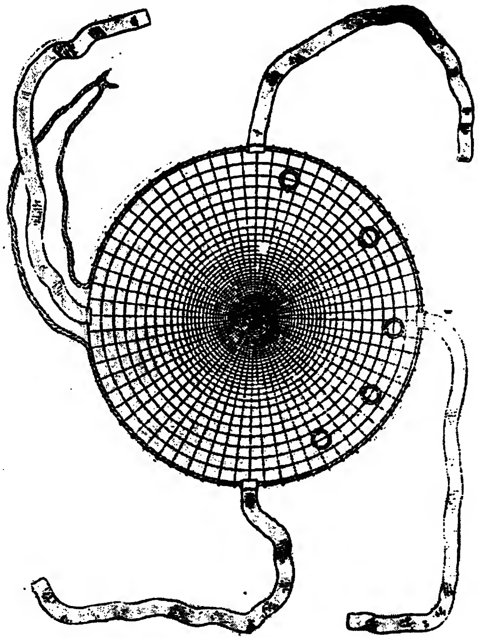


FIG. 74.—Amand's net. (Witkowski).

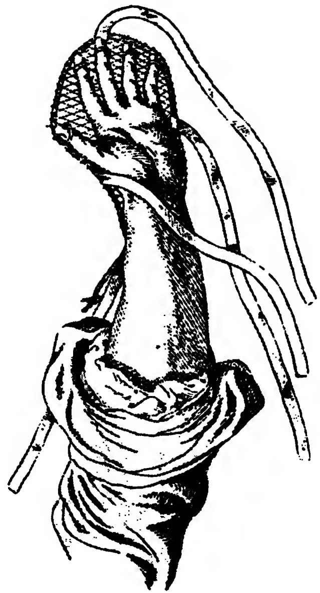


FIG. 75.—Amand's net held in the accoucher's hand ready for introdution. (Witkowski).

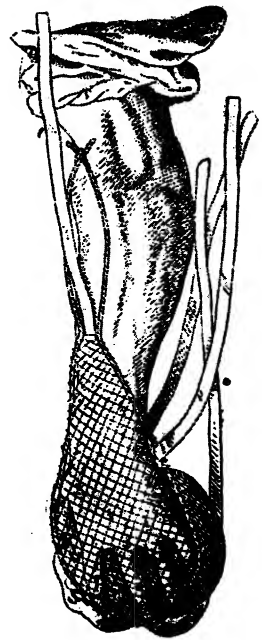


FIG. 76.—Amand's net. Being applied to the fœtal head. (Witkowski).

and the tire-tete, but he did not mention of anything which resembled forceps.

At this period, there was no mechanical means to deliver a woman with safety, for both herself and her child. All the scientific knowledge consisted of perforation of the foetal skull, extraction of the child with some kind forceps with sharp teeth.

Conclusions. We shall conclude this historical sketch of the origin of the obstetric forceps, by freely quoting the views of research workers in this field. The British School is represented by Smellie, Ramsbotham, Aveling, Simpson, Thomas More Madden and the New Sydenham Society's Lexicon of Medicine while the continental schools by Pinard, Rolland, Foullet, Ingerslev and Wyder. The American views are derived from the American Journal of the Medical Sciences, Andrew Currier, Partridge and Ingraham.

(1) **Smellie.*** "With regard to the fillet and forceps, they have been alleged to be late inventions; yet we find Avicenna recommending the use of both. The forceps recommended by Avicenna is plainly intended to save the fœtus; for he says, if it cannot be extracted by this instrument, the head must be opened, and the same method used which he describes in his chapter on the delivery of dead children.

To conclude, we find among the ancients several valuable jewels, buried underneath the rubbish of ignorance and superstition; because the assistance of men was seldom solicited in cases of midwifery till the last extremity: And these disadvantages being considered, we ought to be surprised at finding so many excellent observations in the course of their practice; and be ashamed of ourselves for the little improvement we have made in so many centuries, notwithstanding our opportunities and the advantages we had from their experience".

2. **Ramsbotham.†** "Amongst the most ancient writers on medicine and surgery, we meet with no description of any obstetrical instrument at all resembling our forceps. Hippocrates indeed and Celsus both allude to instruments for the

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*Treatise on the Theory and Practice of Midwifery. Published by The New Sydenham Society, 1876, Vol. I, p. 77.

†Obstetric Medicine and Surgery, 5th Ed. 1867, p. 268.

purpose of facilitating difficult labour, but they were of a kind designed merely to extract the child without reference to its life; they consisted entirely of hooks and crotchets, and their use must necessarily have mutilated the foetal body.

The first gleam of such a contrivance sparkles in the works of Rhazes, the Arabian who in the latter part of the tenth century, described a fillet supposed to be adapted to this purpose. We find in Avicenna whose work appeared nearly one hundred years after Rhazes wrote, the obstetric forceps mentioned by name; but whether they were of his own suggestion, or had been in use previously, is by no means clear: it is generally believed, indeed that he was the original inventor."

In Appendix D. p. 706 of the same work Ramsbotham states further:—"In Avicenna's work will be found the first notice of an obstetric forceps; none of his contemporaries, however, or immediate followers, mention them; but Albucasis, about a century after, described and delineated numerous instruments to facilitate parturition, and among them a short and long forceps; the former he styles *misdach,* the latter *almisdach*. It is sufficiently clear that these inventions were intended to supersede the necessity of opening the child's head, or otherwise mutilating it; and they seem to have been proposed with the view of extracting it alive. But I am quite at a loss to understand how this purpose could be answered; for they were formed with a sharp, beaked point at the extremity of each blade and projecting teeth on the internal surface, so that the integuments of the child's head and face must of necessity have been lacerated. Albucasis, indeed, even gives directions that if the head be too large to pass, it should be crushed by the closure of the blades. On the whole, therefore, the Arabian forceps, so far from being considered an improvement on the instruments previously in use, can only be regarded as a clumsy and barbarous attempt at what has fortunately in after ages been accomplished.

We find no particular mention of obstetric forceps from the time of Avicenna till the year 1554, when Rueffe of Zurich, in a work "de conceptu et generatione hominis," dedicated

a chapter to the consideration of obstetric instruments, under the title "de mode quo et quibus instrument is impediti et mortui infantes producendi". In this treatise he describes and delineates two kinds of forceps, the one with a beaked extremity, and the other perfectly smooth and unarmed; which latter he distinguishes as "forceps qua dentes eruntur;" and this is the first attempt recorded of any obstetrical assistant (except the fillet) by which it was possible to extract a foetus without injury to its person. Rueffe's forceps, however, like all the former, were made with a common fixed joint, so that both blades must necessarily be introduced at the same time and consequently they were almost useless from the difficulty of their application. Rueffe has not left us the dimensions of the instrument he suggested, but from the cut attached to his work they appear very similar to our common lithotomy forceps, with the exception of the internal surface being smooth.

We are indebted to Dr. Paul, the elder Chamberlen, for the valuable improvement of separating the blades, introducing them singly, as fixing them after their application".

3. **Aveling.** (*"The Chamberlens and the Midwifery* forceps, Memorials of the family and an Essay on the Invention of the Instrument" Published by J. & A. Churchill 1882. P. 215.). "It is beyond doubt a fact that Arabian Surgeons used forceps to deliver the foetal head in difficult labours. Avicenna mentions them and Albucasis gives drawings of barbarous instrument which were intended to be used as Cranioclasts. It is not, however proposed to consider these or any other evidences of the existence of midwifery forceps in remote times, for to whatever state of perfection they might have been brought, all knowledge of them had for centuries been lost and re-invention had become a necessity.

Nor will the question be considered whether Rueff had any right to be looked upon as the inventor of Midwifery forceps or rather of its proto-type, for he has no such claim. In 1554 he published a book on midwifery, ("De conceptu et generatione hominis, etc.) which bears no evidence of his being an obstetrician of exceptional talent. The book was inferior to that of Rhodion which preceded it and contained a large amount

of useless and mischievous matter. Unfortunately for English matrons, it was translated into our language under the title of "The Expert Midwife" and became popular with midwifes who learnt from it much of which it had been better they had remained ignorant. Rueff displayed no signs of originality or genius in this book and his name would scarcely now be known, had it not been for his description of the method by which dead children should be extracted and the instruments he advised to be used for that purpose, *viz.* the duck-bill forceps, the tooth forceps and the long and smooth forceps. It is to the mention of this last named instrument that he owes his notoriety but it is evident that he selected the three instruments from the ordinary surgeon's armamentarium of that period, considering them to be most appropriate for seizing the head of a dead fetus. He lays no claim to be the inventor of any one of them and probably mentions them in what he considered to be their order of merit and efficiency. The long and smooth forceps, of which there is a representation in his book, is as Mulder observes, like lithotomy forceps and it is possible that it may have been made for extracting stones from the bladder. It would have been no more his intention to grasp the whole foetal head with this instrument, than with the tooth forceps, both of which could only have been used to seize portions of the broken-up foetal skull. Curiously enough, Heister recommends stone forceps for extracting a dead fetus. He says "They also act with reason, in my opinion, who use the large forceps for extracting the stone, as much better than hooks or any other instrument". Whatever this long and smooth forceps was originally used for, it is impossible now to say, but it seems most improbable that Rueff, ever intended it to be used in the same manner as the modern midwifery forceps, of the construction and beneficent use of which he had not the slightest knowledge. Is it possible that an obstetrician who had invented and appreciated the midwifery forceps, could recommend or even mention the use of tooth forceps for the extraction of the foetal head? The two portions of the Chamberlen forceps were separable and in this consisted the novelty and excellence of the instrument. Rueff's forceps had no such arrangement.

It is not intended to consider the claims of other supposed inventors of the midwifery forceps, for the memorials of the Chamberlen family now before the reader irresistably prove that to one of these four generations of obstetricians, the honour of the invention belongs."

4. **Simpson.*** "Modern midwifery may be regarded as taking its origin towards the close of the sixteenth century, when Ambrose Pare revived and recommended in his surgical writings the operation of Turning as a means of delivery in difficult and dangerous cases, and his pupil, Guilemeau, still further popularised the procedure in his special work on Midwifery. Through the painful centuries women had depended for aid in their deliveries on members of their own sex who had acquired some skill and experience more or less in the management of labour, and who sometimes transmitted the practice from mother to daughter. These "Wise-women" had little or no medical knowledge or surgical skill. When they had a labour in hand where nature was insufficient they called in a surgeon or physician, too often when the life of mother or child, or both, was already doomed. The practitioner thus called in had most frequently to do what he could to terminate the delivery by some embryotomic procedure. To the dislike of the presence of a man, the sufferer had the added dread of a dangerous and often deadly operation when a medical practitioner was called in to aid a delivery. Apart from the rule of thumb knowledge that may have passed from one individual to another, midwives were dependent for any instruction they had on books written for them by men such as Eucharius Rosslin and Jacob Rueff.

A struggle was now about to begin, however, between them and the members of our profession as to whether the midwife or the doctor should be paramount in the delivery-room, in which the gradually extending power of the printing press gave the men who wrote and read the works on science and

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*The invention and evolution of the Midwifery Forceps, Scottish, Medical and Surgical Journal, Dec. 1900.

art an advantage over the women. It was not that there were absolutely no female writers on obstetrics. Louise Bourgeois, the Court sage-femme of Mary of Medici, Queen of Henry IV., wrote a book for the benefit of her daughter, in which she claims to have proposed and carried out the operation of Turning in cases of placenta praevia, though she may have learned it from her husband who was a friend of Guillemeau. Marguerite de Tertre also, the sage-femme-in-Chief at the Hotel Dieu, wrote a text-book for her pupils in 1717. But neither these, nor the work of Justine Sigmundin in Germany, or of Jane Sharp or Mrs. Nihell in England, could hold their ground against the many volumes that were produced by men trained as physicians and surgeons, some of whom began to make a speciality more or less distinct of obstetrics.

In the middle of the seventeenth century another element came in to contribute to the transference of midwifery from the care of women to the charge of men—the element of fashion. Astruc is the authority for dating the era of man-midwifery from the confinement of Louise de la Valliere, the earliest of Louis XIV.'s concubines, in 1663. The Great Monarch, as his people loved to call him, was then passionately devoted to the fair, perhaps delicate, and slightly lame girl, and as she wished her condition and her confinement to be kept secret, he had her attended by Jules Clement, who afterward attended members of the Royal family both of France and Spain, as well as other ladies of the Court. The custom which was begun in Royal circles in France and Spain and England gradually spread through the community, but it was not till after many a tirade had been written against men-midwives and man-midwifery that in the course of the eighteenth century the doctors were left supreme. In the transition period it might happen that a lady chaffed by her friends for having been laid by a woman would reply, "But my husband paid a doctor to be in the house at the time though I didn't need him". And has not Tristram Shandy related how his father had engaged Dr. Slop against the mother's wishes to be in attendance, and how the doctor sat in Shandy Hall, sometimes dozing, sometimes discussing various themes with the anxious father and Uncle Toby, until he was

summoned eventually to deliver the lady with disastrous results to the bridge of the baby's nose.

The power of the printing-press, however, and the power of fashion conjoined would not have sufficed to give men predominance in the lying-in room unless they had been able to devise harmless forceps for the extraction of the infant when its head was impacted in the pelvis. As a result, we find towards the close of the seventeenth century, practitioners directing attention more and more freely to the difficulties of labour, and casting about for some safe method of extracting the impacted head. There were rumours in the obstetrical world that the much-needed implement had been discovered. But the leading obstetricians remained incredulous.

Jean Palfyn, Anatomist and Surgeon in the City of Ghent, has the merit of having first offered to the profession a rudimentary pair of safe forceps. He had already in 1708 published an anatomical work, and when in Paris, in 1720, putting a volume through the press, he submitted to the Royal Academy of Sciences a forceps which is figured in Heister's surgery.

For more than a century the forceps had already been pursuing a career of beneficence. But its employment was restricted to the hands of the members of a very remarkable family. That the instrument which gave the Chamberlens for four generations their pre-eminence as obstetricians was none other than the safe midwifery forceps was conclusively demonstrated in 1813. In that year there was discovered in a closet above the porch of Dr. Peter Chamberlen's old mansion, Woodham Mortimer Hall, a chest, the obstetrical contents of which were deposited by Mr. Carwardine among the Archives of the Medico-Chirurgical Society of London in 1818, where they may still be seen."

5. **Thomas More Madden,** in a paper read before the Obstetrical Society of Dublin on July 10th 1875 made the following remarks regarding the history of the Midwifery forceps. (*Vide* The Obstetrical Journal of Great Britain and Ireland, Vol. III, Page 532 *et seq.*).

"The history of the invention of the midwifery forceps, the strange disuse into which it fell for many years, and its

reintroduction into modern practice, form one of the most interesting chapters in the annals of medical discovery, and convey a lesson, the practical application of which to the present time has been too generally lost sight of owing to the prevailing neglect of ancient medical literature.

The invention of the forceps is generally ascribed to the elder Chamberlen. Having, however, devoted a good deal of attention to this question, it appears to me that the only merit the Chamberlens are entitled to is that of improving an old and less perfect instrument, designed for the same purpose, and described in works with which Dr. Paul Chamberlen, who lived at a time when medical literature was circulated in a language common to the learned in all countries, could hardly fail to be conversant.

The forceps is not mentioned by any of the known Greek or Roman medical writers, whose obstetric knowledge, however, with the exception of Celsus, was extremely limited. There is evidence that the forceps, or something of the same kind intended for the same purpose, was not unknown to the midwives at least eighteen hundred years ago, in the discovery of a similar instrument in the house of a Roman Obstetrix in the excavations at Pompii. (See Adams, "Translation of Paulus Æginceta," Vol. I. P. 652).

The first known reference to the forceps is that of Avicenna, the Arabian physician of the tenth century.

A century after the time we find two midwifery instruments, were described by Albucasis—*i.e.*, the long forceps or Almisdach, and the short forceps, or Misdach. But these instruments, from their construction, were obviously not intended for the extraction of a living child and hence may be dismissed without further consideration.

Jacobus Rueff, describes and gives an engraving of a midwifery forceps (*Vide* "De Conceptu," &c., in Spachius' "Gynæcociorium," P. 179).

The earliest English reference to the use of any instrument, apparently for the same purpose as the vectis, is contained in James Cook's "Mellificum Chirurgiae, or Marrow of Chirurgery," the first edition of which was published in

1647, and is quoted in Dr. Aveling's interesting "Biographical Sketches of British Obstetricians," in the Obstetrical Journal for October, 1873:—"Being commanded by the Lady Dowager Brook to wait on her to London, to take the consult of physicians, in the way before we came to Tossiter, we met with the tidings of that fatal fire of London, which caused her Honour to resolve for Hackney. After some time of her being there I was desired by Mrs. Hatton to go, visit one near her time of her first child, who was aged. She begged of me to come to her if there was need. I told her there were several men abler than myself, and fitted with instruments which I wanted, that might be had from the city (he, doubtless, here, says Dr. Aveling, refers to Peter Chamberlen). After two or three days, in the night she sent for me. I being very much indisposed, and the night tempestuous, I denyed; but, being very much inportuned by a gentlewoman, I went. When come, I made trial, and found the child came right, but without advantage, though pains were strong.

I made use of what came next my thought, getting it a little better fitted at a smith's shop hard by, with which I brought away the child, though with much difficulty."

The forceps of Avicenna, like those of Jacobus Rueff, were small and imperfect instruments, the opposite blades being united by a fixed point, and therefore necessarily introduced into the vagina together, and there opened to catch hold of the head of the child, si possible sit! The same mal-construction occurs in Chamberlen's first forceps, which was exhibited by Dr. M'Clintock at the last meeting of this Society, and is merely an enlarged copy, with fenestrated blades, of the "forcipes longa et tersa," described by Rueff in 1524. In Chamberlen's second forceps we find that he had discovered the inconvenience of the fixed point, and I think the only credit he deserves is that of opening and enlarging the blades, and doing away with this articulation.

6. The following extracts are made from the **New Sydenham Society's Lexicon of Medicine and the allied sciences.**

"The midwifery forceps which is intended to effect the extraction of a living child, dates from the time of the Chamberlens, some little while before 1647. At a much earlier date than this, instruments were used for the extraction of the child by gripping its head, but they were such that by no possibility could the child survive, after their application. The instruments described by Hippocrates for wrenching the fœtus from its mother were for cutting and crushing previous to extraction ; Soranus of Ephesus used two hooks simultaneously, as also after him Ætius and Paulus of Egina, as well as a forceps for breaking down the bones of the head ; similar instrument for pulling at the crushed head after attachment to it by insertion into the orbit or the mouth or other part were described by Albucasis and Rhodion ; a little later Ambrose Pare used three hooked instruments to fasten into the head of a dead child to pull it out and in 1554 Rueff of Zurich figured a pair of forceps for extraction of the fœtus, which contained apparently the suggestion of possible safety for a living child. To the Chamberlens belongs the credit, of the invention of an instrument which could be used with safety to both mother and child and which has been the parent of all subsequent forms of mdwifery forceps."

7. **Pinard.** (See, Dictionnaire Encyclopedique des Sciences Medicales. Directeur, A. Dechambre 4th series, 3rd vol. p. 524). "It may be safely assumed that the idea of supplementing or replacing nature by the application of hands or of instruments to the fœtal head existed since very remote times. It is interesting to note the rapid evolution that has taken place from the primitive instruments representing the hands of the accoucheur to the perfected instruments of the present day. The idea of ancient physicians as to the use of two hands to extract the fœtal head retained in the pelvis, was no doubt ingenious but was difficult, nay impossible to put into practice.

Accoucheurs having recognised the impossibility of introducing the hands between the head and the pelvic wall, invented instruments of various forms which could be introduced easily, at least in a majority of cases.

It was then that the single crochets appeared at first and soon after in couples so that they could act on both sides of the head.

It must, however, be remembered that the only aim of the operator was to deliver the woman by extracting the fœtus, entire or in bits. In all cases, a dead fœtus was dragged out, whether the fœtus was dead before intervention or it succumbed owing to the violence of the instruments used during extraction.

As Chereau very justly remarks, Avicenna, was one of the first, if not, the first, to recommend the use of an instrument, for the purpose of extracting the fœtus, without necessarily sacrificing it.

Jacob Rueff, in 1554, described an instrument by which it was possible to obtain a living child.

Why then were these fine ideas capable of being easily fulfilled, abandoned so long? Why these men, who, realized the truth, had no imitators for more than a century. This remains inexplicable, if it is admitted that the accouchers of the time were cognisant of these facts.

Whatever may be the reason it was during the 17th century that the first forceps was designed constructed and employed by Chamberlen and Palfyn, which enabled the obstetrician to save both the mother and the child".

8. **Rolland.** ("Thesis on "Forceps Lyonnais" based upon Thenance's Memoirs on "Nouveau Forceps non-croise ou Forceps Du Celebre, Levret; perfectione en, 1781 avec La Maire De S'en servir".

"The forceps dates from the period of Celse, about one hundred and fifty years before Galien. Celse would make use of a hook which was quite smooth on all its sides.

Avicenne, a Mahomedan Doctor, recommended a forceps which was armed with long teeth. A similar instrument is figured in the works of Ambroise Pare. It is a kind of fork with two long prongs, folded back in the centre, and two others, blunt and curved in, and roughened like a file. Gillemeau, one of Ambroise Pare's pupils, also used this kind of forceps.

Towards the end of the 17th century, Mauriceau, in his "Traité des Maladies des femmes grosses et de celles qui sont

accouchees" described the use of a head extracting hook after slitting the fontanelle. His head extractor, consisted of two round plates, mounted on a rod. One of the plates is pushed into the cranium, and the other is brought close to the first by means of a screw. Mauriceau also proposed the use of a strip of cloth, with a hole in the middle, for slipping over the child's head.

Mention might be made of the tire-tete or head-extractor of Friede. (*Vide*, Traite des accouchements de Richard Manningham, medecin de Londres, P. 154).

Menard invented an instrument which is figured in his "Guide des accouchenrs ou le maitre dans l'art d'accoucher les fammes, Paris 1743". It was a sort of toothed forceps with the teeth bent backwards. The instrument was thus not at all efficient.

Jean Palfin, surgeon, anatomist and lecturer in Surgery in Gand, presented to the Academy of Sciences of Paris, in 1722, an instrument for extracting the head of the infant impacted in the pelvic cavity. Palfin was born in 1649, but his place of birth was not exactly known. It was either at Contrai or at Gand.

Sometime after Palfin's communication to the Academy of Sciences, Gilles le Doux, claimed to be the inventor of that instrument. This instrument is shaped like a spoon, or a scoop as may be seen in Pare (24° livre de la generation, chap. 33). Gilles le Doux, was in the habit of tying together two such instruments, and in that way, employed them with some amount of success although as a single instrument, its utility was very defective. The fundamental idea of forceps may thus be said to have been originated by Gilles le Doux.

It was soon found out that when the two instruments were used together, they very often got displaced. In order to obviate this difficulty, a portion of each branch was flattened so as to allow them to be joined together by a screw, this arrangement allowed a firm grasp of the head but it was not possible to cross the two branches.

In order to facilitate the crossing of the two branches Palfin, had the flattened portions lengthened and did away

with the screw. Instead of the screw arrangement, he had a pivot rivetted on to one branch. The pivot had a short collar, which fitted on to a corresponding hole made on the other branch, to receive the pivot. On the opposite side of this portion of the latter, is attached a plate with hole equal to the size of the diameter of the pivot. By this arrangement, the two branches could be held together very well.

In order to obtain a better hold of a head which is still lying in the uterus and to extract it a transverse opening was made at the extremity of the spoon-shaped portion of one of the branches while a hook-shaped projection was inserted in the other branch. Petit invented a kind of a pot-hook which allowed the instrument to be regulated.

The lower portions of the instrument were, first, made "in the form of a saw"; with wooden handle like that of hooks. From this one can see how the forceps originated. Then came oblong rings in the middle of the wooden handles which were subsequently transformed into open hooks on the aspect. The branches were then curved near the joint.

The upper spoonshaped portion of the forceps was at first very wide; but later on it was made narrower at its lower end in the shape of a crescent This was then fenestrated, so that at present, each blade has only merely the borders left. This improvement as well as the sliding joint, is due to Dr. Chamberlayn.

9. **Poullet** in his monograph (Des Diverses Especes de forceps, leurs advantages et eurs inconvenients, Par Se Dr. J. Poullet Paris, Libraire J. B. Bailliere et fils. 1883), says "One is not perhaps very far from the truth in believing that this invention dated from 1625 or 1630. It is therefore about 250 years that the forceps have been in use.

10. **Ingerslev,** in his monograph on "Forceps" published in the German language in 1891, states as follows:—"The attempts which have been made in different branches of medicine to trace its development in oldest times, even to the Hippocratic age, show that questions regarding the forceps could not be successfully solved. Thorough and painstaking researches regarding the age of the obstetric forceps, have

definitely established the fact that the existence of forceps was not known before a century and a half".

11. **Wyder** of Zurich (in Winckel's Handbuch der Geburtshulfe, Third Vol. Part 1, p. 482, 1906) states "As obstetrics must certainly be as old as mankind itself, it is a remarkable fact that till about 300 years ago, there existed no means to satisfactorily deal with the numerous cases of difficult head presentations."

"It seems proved beyond doubt that Peter Chamberlen the elder (1560-1631) is the real inventor of the forceps and that accordingly, the year about 1600, is to be taken as the "birth-year" of the forceps".

12. In a review of Aveling's work on the "Chamberlens and the midwefery forceps," in the **American Journal of the Medical Sciences** for April 1883 the reviewer asks himself the question :—

Were forceps used in the extraction of living fœtuses before the time of the Chamberlens; and if so, when? and answers as follows :—

"Having carefully examined this subject *de novo,* I am prepared to answer the question in a measure satisfactorily. The claim of priority has been made by obstetrical writers, for three authors, whose case will be investigated, commencing with the latest *viz.* :—

In the original edition of the work by Jacob Rueff, entitled "De Conceptu et Generatione Hominis," published in Zurich in 1554, we find a wood-cut, representing a pair of forceps, which some have presumed were designed to grasp the fœtal head and deliver a living child. This instrument resembled a pair of lithotomy forceps, and was evidently a cranioclast. The blades were riveted together at the joint, were long, slightly curved and hollowed, and devoid of serratures. Such an instrument could not possibly be introduced, so as to include within its grasp the fœtal head. In fact, Rueff distinctly states, that it was intended to be used upon the dead fœtus.

2. In the work of Albucassis (Kalaf-Ebn-Abbas-Abu'l-Kasem), are pictures of two pairs of long pincers, having semiangular jaws ; one pair armed with teeth, the other plain.

The latter has been claimed to have been designed to seize the head of and deliver a living child; but a careful examination, of its form, mechanism, and proportions, will show that it could only have been used as a craniotomy forceps. With a fixed joint, such an instrument could never be introduced so as to grasp the head · in fact, Albucassis calls it "a form of crusher for breaking up the head of the foetus". Abu'l-Kasem was born at Zehera, near Cordova, in Spain, and is said to have practised for part of his life in Arabia. His book was written in Arabic, and contains a large surgical armamentarium, among which are the forceps named. He does not appear to have heard of the form of forceps spoken of by Avicenna, although conversant with the works of many of his predecessors. According to Sprengel's History of Medicine, he died A.D. 1122; other historians have dated his death at 1110.

3. In the work of Avicenna (Al-Hassain-Abou-Ali-Ben-Abdallah-Ebn-Sinh), surnamed the "Prince of Medicine," we have, however, the evidence that there was a form of forceps designed to deliver the living fœtus. The pattern of this instrument has not been presented, either in the text or an illustration, and we are not informed as to the mode of its introduction; but sufficient, although a very unsatisfactory evidence exists, to show that there was such an extractor in use. Ebn-Sina was born in Arabia near Bokhara, A.D. 980, and died in 1036 or 1037. He wrote a voluminous work upon general medicine in his native tongue, which was translated into Latin. (Canon Medicinæ, Lib. III. Fen. 21. Tract. 2. Cap. 28, p. 932, edition of 1595, in 1 volume; "Junta Avicennæ"), from which we make the following quotation, which may be found in a number of obstetrical treatises, but without the heading or translation:—

"De regimine ejus cujus partus fit difficilis causa magnitudinis fœtus".

"Oporteti ut inveniat obstetrix possibilitatem hujusmodi foetus quare subtilietur in extractione ejus paulatim; tunc si valet illud in eo bene est; et si non liget eum cum margine panni et trahat eum subtilitur valde cum quibusdam attractionibus. Quod si illud non confert administrentur forcipes at

extrahatur cum eis. Si vero non confert illud, extrahatur cum incisione, secundum quod facile fit, et regatur regimine foetus mortui".

Of the management of her, whose delivery is made difficult by reason of the greatness of the foetus.

It behoves that the midwife shall find out (or effect) a possibility of this kind of fœtus, wherefore let it be by little and little (gradually) done finely (finessed); in its extraction; then if that is effective in him, it is well; and, if not, let her tie him with the edge of a cloth (head-band or fillet) and draw him lightly, strongly, with certain drawing together. But if that is not efficient, let forceps be employed (hand to hand) and let him be drawn out with them. If, indeed, that is not efficient, let him be drawn out with incision, after which it is done easily, and let it be managed by the rule of the dead fœtus.

This is a literal rendering of the Latin, which may be expressed in fair English thus:—

It is necessary for the midwife (there were men-midwives in Arabia then) to discover the possible existence of this kind of (an inordinately large) fœtus; therefore let him (or her) exercise great skill in its gradual delivery; then if this is accomplished, well, and if not, let him (or her) bind it with a fillet and draw carefully and forcibly. If he (or she) does not succeed in this, let the forceps be applied, and let it be delivered by them. If this is not successful, he (or she) must deliver it with an incision, after which it may be done easily; and and be governed, as (already explained) in the case of a dead fœtus.

We cannot put upon this paragraph of Avicenna the very liberal construction given to it by Smellie, in the historical introduction of his work upon midwifery. There is nothing in the language to indicate that the fillet is to be thrown around the head; the forceps applied to it; or the head opened and evacuated. We infer that the passage treats of a head case, from what the author has already written about, in this section, on midwifery. He has elsewhere treated of presentations of the feet and side, and has given directions for the

management of cases, having dropsy of the head, chest, and abdomen, and has repeatedly recommended the use of the knife upon the fœtus, for its delivery, when obstructed by its abnormal growth or position. We are to infer then, by negative evidence, that this paragraph treats of the management of the fœtus when presenting by the head, but obstructed in its passage through the pelvis, by reason of its disproportionate size as relating to the latter. The fœtus being of normal form, but too large to be delivered naturally, is to be assisted by the fillet; then by the forceps, if requiring more force; and lastly, in the event of failure, to have its head split open, as already recommended in cases of extremity. What Avicenna wrote upon obstetrics was chiefly a compilation and the sources from whence he drew, may be readily ascertained but what he says of the forceps is original, and some have supposed that he contrived the instrument. Be this as it may, we have no evidence that the knowledge of it was ever general in Arabia, or its use long continued. If it ever was employed as the Chamberlens used it, the knowledge of its having been so used, must have died out centuries ago, strange as this may appear. We are disposed to be liberal towards Avicenna in our interpretation of what he has written, but we could wish that he had been so explicit in his language, as to leave no doubt as to his full meaning.

Although we must admit, that in all probability, the Arabians had the ability nearly nine hundred years ago to deliver a fœtus alive, by means of an instrument analogous to the forceps of the Chamberlens this does not detract from the merit of the member of the family, who restored the lost art without knowing of its pre-existence. At the present day, the secrecy and monopoly of the use of an instrument so important to human life, would be condemned as devoid of humanity; and the parties keeping the secret would be ostracized as the princes of charlatanry. But in the day of the Chamberlens such conduct was viewed differently, and the discoveries of a physician were regarded as his stock-in-trade, and were seldom published until age or independence diminished their personal value, or the necessity for concealment. Now everything is

changed, and we would regard the seven Chamberlens, if living, as quacks, so long as they kept their process of delivery from the eye of the profession. Paul Chamberlen was for other reasons a charlatan; but all would be, if now living, and keeping their method a secret for the purpose of making money. Speaking of him, the thought occurs to me, that at the time of his death (1717) the secret was out, and that it must have become known at the time of, or soon after the death of John, in 1700. Possibly at his death, his forceps told the story to Chapman and his brethren, who so mysteriously came into the possession of it, for some years, before they published its true character to the world."

13. The following quotation is from, **Stedman's Reference Handbook of the Medical Sciences**—Vol. IV, page 506 Article, on Obstetrical Forceps, by **Andrew F. Currier.** "It is probable that no mechanical apparatus which was ever constructed has rendered half the service and benefits to the human race which has been rendered by the obstetrical forceps. We all come into the world practically in the same way, through the passage in the maternal generative organs which are enclosed with the maternal pelvis.

Parturition is the most natural thing in the world and when the conditions which surround it are natural, midwives and obstetricians are superfluous and may be regarded in the light of luxuries. But there is no physiological function of which there are no deviations from the normal. Man and animal are occasionally in a hopeless situation with regard to the function of parturition, and it then becomes simply impossible of accomplishment without the assistance of art and human intelligence. Hence arose the necessity for some sort of a contrivance which should serve as an extension of the hands of the midwife, which should grasp and extract the living being which was struggling to get into the world, and which would do it without killing or maiming it.

Midwifery is an art which is so ancient that it seems incredible that those who devoted their time, their thought, and their observation to it in the ages before the dawn of history should not have found some expedient of a mechanical

character to help women who were unable to deliver themselves. People were not all fools in prehistoric times and the logical process of reasoning of deduction from observation, and of drawing valid conclusions must have resided with some of those who practised midwifery. But if they made use of any mechanical apparatus tradition did not hand down any account of it to those who began to write history, and so we have nothing but our imagination to fall back upon in regard to their operative obstetrics.

The book of Genesis antedates the father of medical history by many centuries. From this book we learn of the death of Rachel "in hard labor". "And Rachel travailed and she had hard labor. And it came to pass that when she was in hard labor the midwife said unto her, Fear not, thou shalt have this son also. And it came to pass as her soul was departing (for she died) that she called his name Ben-oni, but his father called him Benjamin." (Gen. xxxv, 16. 17. 18).

In the book of Exodus we also have a picture of midwifery practice in Egypt and a statement that Hebrew women were delivered more readily by the midwives than Egyptian women. "And the King of Egypt called for the midwives and said unto them. Why have ye done this thing, and have saved the men children alive? And the midwifes said unto Pharaoh, Because the Hebrew women are not as the Egyptian women, for they are lively and are delivered ere the midwives come in unto them". (Ex. 1. 18. 19). Again the imagination fills in the gap and pictures the hard labors which fell to the lot of some of the Egyptians, with no record as to the means by which they were delivered.

Hippocrates, who is usually regarded as the father of scientific medicine, using the term in its broadest sense and differentiating it particularly from the so-called medical practice of priests and conjurers, was a keen observer, a philosophic thinker, and a very voluminous writer. Among his many contributions to theoretical and practical medicine there were observations relating to obstetrics but in none of them do we find any intimation that he was in the habit of using any other instrument than his hands for the assistance of parturient

women and these he used in prolonged labors, for traction when the head of the fœtus was small. (An exception should be made in regard to the crotchet which was described by Hippocrates, by Aetius, and by all other ancient writers on midwifery, but was used only when the child was dead or its life was despaired of).

The Arabians in the tenth and eleventh centuries kept the lamp of medicine burning when it was dim or had gone out among other nations, and we find in their writings the record of the use of forceps in labors which were difficult. But the forceps of Albucasis and Avicenna were properly cranioclasts with three or four blades and teeth, for grasping the fœtal head on the inner surface of the blades. They were destructive instruments and were evidently employed only when fœtus was dead or when it could not be delivered alive.

Rueff (1554) used a long smooth-jointed lithotomy forceps for the extraction of dead fœtuses. He also used a duck-bill forceps and a toothed forceps. A three-bladed duck-bill lithotomy forceps was employed about the same time by Pierre Franco and by Heister under similar indications, in preference to hooks, which had previously been used. In other words, the principle of traction for the delivery of the fœtus had probably been recognized for many centuries."

14. **H. G. Partridge** of Providence, Rhode Island, read a paper before the Providence Clinical club on "the History of the Obstetric Forceps." (See American Journal of Obstetrics 1905 Vol. 51 p. 765). He discusses the question relating to the introduction of the obstetric forceps. "I use the word introduction rather than the term invention, advisedly because...... ......our ideas as to the actual origin of the instrument are vague and indeterminate......The earliest direct evidence which we have of the use of forceps in obstetrics is the discovery of a crude instrument evidently intended for this purpose in the surgeon's house in Pompeii......I have been unable however to find any extended description of the instruments discovered. There is no reference to the use of such an instrument in the works of Hippocrates, Celsus, Galen, Paulus Aegineta or in the writings of any of the early Greek or Roman

Scholars......The first writer who mentions the use of the forceps for the extraction of the living child is Avicenna." The following is a free translation into English from the Latin Translation of the original writings, published in 1555 Chap. 28. Of the conduct of the (case) the delivery of which is difficult because of the size of the fetus.

It is necessary that the obstetrician exercises a good holding back of the fœtus of this kind. Wherefore particularly in the extraction of it (it should be done), gradually; then if that avails for it, it is well; and if not he may bind it about with a border of cord, and may draw it carefully, with repeated tractions. But if that does not bring it on, forceps may be used, and it may be extracted with them. If in truth that does not bring it on, it may be extracted by incision and according as it may be easy, and may be treated in the manner of a dead fœtus.

His statement as given above will be seen to be a very direct reference to the possibility of delivering a living child by means of forceps and is the first mention of such employment of them to be found in literature.........Other writers after this date also mention a similar use of the forceps, but notwithstanding these references we have no evidence as to who first devised the plan of so aiding Nature. It was probably a gradual outgrowth of experience and an attempt to substitute an instrument for the hand of the accoucheur.

Among these later writers Jacobus Rueff should be especially mentioned. He wrote a treatise on obstetrics which was published in 1554 and in it describes and illustrates a long and a short forceps. He expressly states that his instrument has on it no teeth and that the child may be easily delivered by means of this forceps, if it be possible to apply them to the head. The forceps described by these various writers were crude affairs, the baldes being solid and the two joined at a fixed point and therefore they could be introduced together only and then adjusted about the head. A moment's thought will enable one to appreciate how difficult this may have been in many cases and as a result how limited was the field of usefulness of the instrument.

During the next hundred years no advance was made either in the construction or in the use of the forceps. In the seventeenth century however the noted family of Chamberlens did so much in both regards that by many writers they have been described as the veritable inventors of the forceps. That this at least is not true, we have already seen, and this family famous though it may be, deserves credit only for improving the construction of the instrument and for bettering the techinque of its use. Partridge then recounts some details regarding this family and observes:—"We have seen that they did not discover or invent the forceps and it can hardly be denied that others of their day must have known of the use of such an instrument as described by some of the earlier writers. What did this family do?

By comparing these (the four forceps discovered at Woodham Mortimer Hall) with the description of the crude forceps given by Jacobus Rueff, it will be seen that the Chamberlens simply improved this old model. They disconnected the blades so that they might be introduced separately. They made the blades with fenestra and enlarged them somewhat. For doing these things the family deserves great credit no doubt, but the base and mercenary way in which they kept the knowledge from their fellow practitioners almost clouds any lustre which may have been added to their names by their ingenuity and stamps them as utterly disreputable."...

"We have next to ask, how did the use of the instrument become general? This link in the chain is, up to the present time, missing.

Hugh Chamberlin, the younger, died in 1728. We know that about this time Palfyn, a Dutch surgeon showed and used a form of forceps. Drinkwater, an obstetrician of England, left at the time of his death, in 1728, a pair forceps and others mention such an instrument in their writings. We do not know, however, whether these various obstetricians independently devised the instruments used by them or whether they had knowledge in some way of the Chamberlen's instrument. However, this may be, two writers deserve especial mention as being instrumental in publishing descriptions of forceps and

urging their use. These two men are Edmund Chapman and William Giffard. Most writers state that it was Chapman who first described the forceps and published accounts of patients delivered by means of this instrument. On consulting the contemporary writers and the writings of the two authors themselves we find, however, that to William Giffard belongs the honor of the introduction of the forceps into use as an obstetric instrument."

Partridge then stated facts as derived from original sources to prove that Giffard was the altruistic and honorable physician who should receive full credit for introducing the forceps into common use in England.

15. **Clarence B. Ingraham** (American Journal of Obstetrics 1911 Vol. 63 p. 827) in his paper on "The Chamberlens and the obstetrical forceps" read before the Denver Historical Club stated as follows:—"There is no doubt that the Arabian surgeons used forceps to deliver the fœtal head in difficult labors, as Avicenna mentions them, also Albucasis, who died in 1112, gives drawings of crude forceps used in his time. Their inner surfaces were, however, provided with teeth which were intended to penetrate the head and it is evident that they were used only as cranioclasts on the dead child. The probability is that forceps for the delivery of the living child did not exist in remote times." "According to Aveling and to all investigators it is irresistably proven that the invention of the midwifery forceps belongs to the Chamberlen family."

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(3). Illustrazione degli specili e di altri strumenti chirurgici affini trovati negli scavi di Ercolano e di Pompei (September 15, 1846).

(4). Descrizione dello speculum magnum matricis e dello speculum ani (November 24, 1846).

(5). Delle pinzette, degli ametti, degli aghi, chirurgici e del tridente scavati en Ercolano e in Pompeii (December 1, 1846).

(6). Illustrazione degli strumenti chirurgici di ferro trovati in Ercolano e in Pompeii. (January 19, 1847).

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SECTION II.

THE CHAMBERLENS.

(1601 A. D.—1818 A. D.)

It has been known that there were several generations of Chamberlens and that one of their member had invented the Midwifery forceps. The mystery as to which generation each member of the family belonged and to whom the honour of the invention was due, remained unsolved until Aveling* studied the subject and dispelled the confusion caused by there being three Peters and two Hughs.

William Chamberlen, with his wife and children were living in Paris in 1569 and were suffering, as Huguenots, all the hardships and cruelties to which those of their faith were exposed. Their home was at length rendered intolerable and they determined to leave it and seek shelter and peace in England. The family, consisting of father, mother and three children, Peter, Simon and Jane, landed at Southampton on 3rd July, 1569. Another son, James, was born the year of their arrival. Three years later another son was born, who was named Peter. There were therefore two brothers called Peter, the elder and younger. William Chamberlen very probably practised medicine although there is no positive proof. No record of the date and place of his death is to be found but in a deposition concerning the birth of, Peter the younger, dated 3rd March, 1596, the words "late William Chamberlaine" are used. It is evident therefore that he must have been dead before this time.

Peter Chamberlen (the elder).

His name appears in the "Annals of the Barber Surgeon's company" and from them it is evident that before 1598 "his hood had been put on his shoulders and he had been admitted

*The Chamberlens and the midwifery forceps. Published by J. and A. Churchill, 1882.

into the liverie." Frequent complaints are to be found in the "Annals of the Royal College of Physicians" of his not having confined himself strictly to the practice of surgery. In 1612 he was before the college, accused of practising medicine and his practice was condemned. A warrant was signed for his apprehension and removal to Newgate prison. It should be remembered that although physicians might practise surgery, surgeons might not practise physic, and that the authority of the College was strong and sufficient to commit to prison. Peter Chamberlen did not submit passively to his imprisonment but brought the whole of his large influence to bear upon the college. The Archbishop of Canterbury, at the mandate of the Queen, prevailed with the President and Censors, and Peter was released. It was doubtless due to Peter having attended the Queen in her confinement that she used her influence in endeavouring to obtain his release from prison. In XII James I, 1614 among the physicians, surgeons, and apothecaries receiving fees and annuities payable out of his Majesty's exchequer, occurs the name of "Peter Chamberlen Surgeon to the Queen £40." But besides this there is further evidence of his being in the queen's favour for in his will he mentions "my dimonde ringe which I had of Queene Anne." He was also surgeon to Henrietta Maria, wife of Charles I, as the following extract shows:—"The queen mis-carried of her first child. She had neither midwife nor physician about her......... and Chamberlayne the surgeon was he alone, that did the part of a midwife. This took place in 1628." Peter, the elder died, December, 1631.

Peter Chamberlen (the younger).

He was born 8th February, 1572 and died 16th August, 1626. The probable date of the admission of Peter the younger to the Company of Barber Surgeons was 1596. Like Peter the elder, Peter the younger was in constant conflict with the College of Physicians for "the illegal and evil practice of Medicine". He advocated a movement for the Incorporation of Midwives.

Dr. Peter Chamberlen

(son of Peter the younger).

Born—8th May, 1601. Died—22nd December, 1683

Doctor of Medicine, Padua University		...	1619
Do.	Oxford ,,	...	1620
Do.	Cambridge ,,	...	1621
Fellow of the College of Physicians		...	1628

Selected by the Company of Barber Surgeons to give the yearly demonstration in Anatomy.

In "The Ladies Parliament" by Henry Nevill, 1647, is to be found the following order of the House:—

> "2 ordered further that Dr. Hinton and Dr. Chamberlen be likewise assistants that with greater secrecy and ease their Ladyships may be helped out with their most troublesome and pressing affairs."

His reputation as a practitioner reached Russia and attracted the attention of Czar, who wrote to Charles I requesting him to allow Chamberlen to enter his service. The king politely refused the Czar's request.

He was appointed physician extraordinary to the king.

He had a scheme for incorporating the midwives of London, with himself as Governor. The midwives protested against it and forwarded a petition to the king. An inquiry was held on 22nd October, 1634, and the following order pronounced.

"That the said Doctor Chamberlaine should forthwith bee a Suitor to the Lord Bishopp of London for a Lycence to practize the Art of Midwifery and that hee doe submitt himselfe to take such lawfull Oathes and to perform such duties as shall by his Lordshipp be thought requisite therein. And if in the interim any woman distressed should have occasion to use his helpe before his Lycence were prepared and Oath administered (which was directed to bee donne with all convenient expedicon) hee should not-with-standing without any pretence or reason grounded thereuppon assist such women distressed in travile as should desire his helpe and use his best Art and Industry in performing that Office and to the end that the complaynents may hereafter may live at peace and quyett and not to be

troubled or molested with Doctor Chamberlaine's unlawfull Sumons. Hee was by their Lordshipps comannded and required to desist therein and not to call any Midwifes in such kindes before him, nor they in case hee violated the said Comannd presume to appeare or obey him therein And if they or any of them shall soe appeare Mr. Doctor Ducke Chancellor of London their ordinary then present was required to call them before him and to suspend them from the execucon of their office of Midwifery And it fully appearing unto their Lordshipps that Doctor Chamberlaine was extreamely faulty in compounding for somes of money beforehand with the husbandes or friendes of Women distressed with dangerous and unnaturall travile and delayed to deliver them to the eminent perill and Jeopardy of their lives untill hee had his owne Demanndes; It was therefore Ordered and the said Doctor Chamberlaine was admonished and required indifferently to apply his helpe and skill (when hee is thereunto required) as well to the poor as to the rich as well to the Midwife of one Midwife as of anothers and not to make any bargaine or Composicon before hand whereby to raise to himselfe an unlawfull gaine or to suffer any party in danger of her life to lye unrelieved for want of his present and speedy helpe And in case the said Doctor Chamberlaine shall faill in the performance of his duty in any of the premises and complaint thereof bee made to the King's Advocate, his Maiestye's said Advocate being then present was required forthwith to Article and proceede against him in the High Commission Ex-officio mero that further order may be taken for the reformacon of the said Abuses as the necessity and urgency of soe weighty a matter shall require".

The opposition which Dr. Peter Chamberlen received to his scheme for incorporating the midwives of London aroused in him the strongest feelings and drew from his pen, in 1647 a reply to the accusations against him, entitled "A Voice in Rhama: or the Crie of Women and children." The following quotations from his reply to the charge of avarice, are interesting reading. "I could not well be guilty of exaction:—

(1) For that I seldom bargained beforehand or not above twentie times when exceedingly animated by some fresh injuries

and grosse abuses: although I hold not bargains unlawful so long as the Labourer is worthy of his hire.

(2) They were intrusted with my Operations before they rewarded me with their Purse.

(3) I never arrested any for what was due, whether by bargain, promise or otherwise: although in all abused.

(4) I never demanded the full value of the Operation, if equally compared with other matters of price or other great Operations of Chyrurgery or mine own chargeable Education or with any other Examples."

"The Draper is not bound to find cloth for all the naked because he hath enough in his shop, nor yet to afford it at the Buyers price. The Lawyer is not obliged to spend his voice and spirits for all the Injured in *Forma Pauperis* because he pleads well and shall be heard. Acts of Charitie are more due from kindred than from Strangers. When a husband of sufficient means shall not think his Wife nor Child's life worth 10 *li* I am not bound to bestow that on them which is of more value".

I may here allude to a Judgment in a British Court of Law within the last three decades regarding a suit for damages brought against a practitioner for refusing to attend a patient without stipulating for fees. The Judge dismissed the suit and held that the practitioner was entitled to stipulate for fees. The judgment shows the Judicial view point 250 years after Dr. Peter Chamberlen practised.

Disappointed in his attempt to ameliorate the condition of midwives Dr. Peter Chamberlen next turned his attentions to baths and stoves (1649).

The next project of Dr. Peter Chamberlen lacked the practical utility of his schemes. It was a large Utopian idea and is set forth in a paper entitled "The Poore Man's Advocate or England's Samaritan" published in 1649.

During the whole of the Commonwealth Dr. Peter Chamberlen was possessed and swayed by a religious fanaticism which so completely filled his mind and occupied his time as to leave no leisure for him to indulge in making projects. He seemed to have recovered from this condition of religious

exaltation on the eve of the accession of Charles II for at this time (1659) he printed a politico-religious pamphlet entitled "Legislative Power in Problems". He was appointed Physician in Ordinary to Charles II in 1660.

In April, 1666, Dr. Peter Chamberlen was in Holland and threw all his enthusiasm and energy into a new project, *viz.*, a proposal for propelling Ships and Carriages by Wind. He wrote to his son Hugh in London to secure the patent in England. Hugh having failed to obtain a patent, Dr. Peter Chamberlen came back to England to see after it himself. His prayer was granted to him in 1668-9. It is needless to add that this like the rest of Dr. Peter Chamberlen's projects failed to secure the material assistance and confidence of the public and even he speedily abandoned his wild, chhmerical dream.

Dr. Peter Chamberlen's next project was "a new art or way of writing or printing true English, whereby better to represent to the eye, what the sound doth to the ear than what is now practised." (1672)

At the close of his long life Dr. Peter Chamberlen conceived one last great project, *viz.*, that of "reconciliation of the churches." His hopes and intentions in this matter, which were never consummated, may be gathered from his long correspondence with the Archbishops Sheldon and Sancroft (from 2nd October, 1673 to 19th November, 1682).

Dr. Peter Chamberlen died in 1683 at Woodham Mortimer Hall* near Maldon in Essex and was buried in Woodham Mortimer Churchyard, where his tomb still (1882) stands in a dilapidated condition bearing the following inscription which is rapidly becoming illegible:—

"Here lyes ye body of Doctor Peter Chamberlen, who was born on the 8th of May, 1601 and dyed on the 22nd of December, 1683, being aged 82 years 7 months and 14 days. He had two wives and by ye first Jane Middleton had 11 sons and 2 daughters and amongst them 45 grand-children (whereof

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*This he purchased of Sir Cranmer Harris, continued in his family till about 1715, when it was sold by his son Hope, to Mr. William Alexander, wine merchant, who bequeathed it to the wine coopers' company.

were living at his death 3 sons, *viz.*, Hugh, Paul, and John and his 2 daughters and 20 grand-children and 6 great grand-children). By ye second, Ann Harrison had 3 sons and 2 daughters, whereof only Hope was living at his death, who hath erected this monument in memory of his father.

The Said Peter Chamberlen took ye degree of Doctor of Physick in several Universities both at home and abroad and lived such above three score years, being physician in ordinary

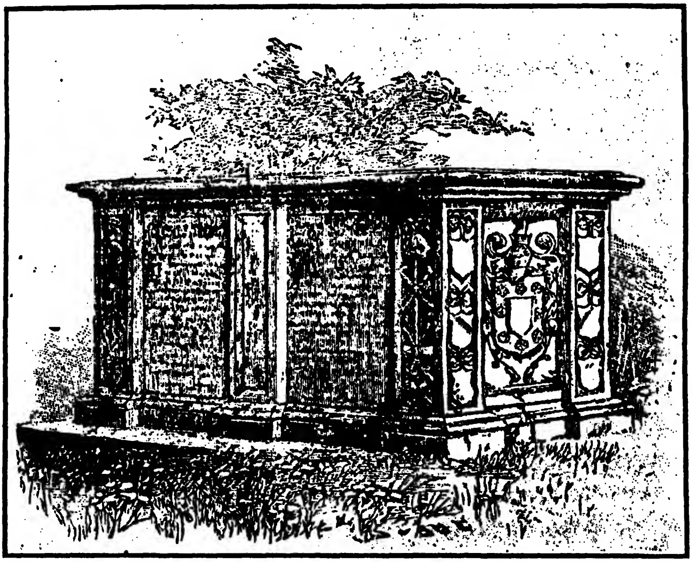

FIG. 77.—Tomb of Dr. Peter Chamberlen (Aveling).

to three kings and queens of England, *viz.*, King James and Queen Anne, King Charles ye First and Queen Mary, King Charles ye Second and Queen Katharine and also to some foreign Princes, having travelled to most parts of Europe and speaking most of the languages. As for his religion was a Christian, Keeping ye Commandments of God and Faith of Jesus, being baptized about ye year 1648* and keeping ye 7th day for ye Sabbath about 32 years.

*This must refer to his baptism as an adult when he joined the Anabaptists who reject infant baptism. He was baptized as an infant, four days after his birth.

'To tell his learning and his life to men
Enough is said, by Here lyes Chamberlen;
Death my last sleep, to ease my careful head,
The grave my hardest, but my easiest bed;
The end of sorrow—labour and of care,
The end of trouble, sickness and of feare.
Here I shall sin no more—no more shall weep,
Here's surely to be found a quiet sleep;
Death's but one night, my life hath many seen
My life brought death—death brings me life againe
Seeds rise to trees—hearbes rise again from seed
Shall bodies then of men obtain worse speed?
We dayly dye entomb'd in sleep and night,
But in the morning we renue our light;
Hence spring my joyes and comfortes evermore
I cannot feele but what Christ felt before.
We now believe, and heare, and talk by guess,
Then I shall see, and what I see possess;
And when I wake wrapt in Eternal light,
Of God and Christ, I know no more of night;
Crown'd with Eternal glories ever blest,
Oh! happy rest that brings me all the rest.
Bodies calcin'd to iemmes like stars shall sing,
Ravish'd with joyes and praises of my king,
Praised be God my Saviour, Praise his name
Angels and Saintes sing with me his fame".

"These verses were found, made and ordered by Doctor Peter Chamberlen, here interred, for his Epitaph".

The following observations appear in an Editorial in the Obstetrical Journal of Great Britain and Ireland. (January, 1875) regarding the portrait of Dr. Peter Chamberlen which is reproduced on page 85.

"The Chamberlens, Peter or Paul? At the last meeting of the obstetrical Society of London the president exhibited to the fellows a portrait of one of the Chamberlens. It is a copy of a not very rare engraving, and represents a gentleman of about sixty years of age, with a very intellectual face and head, and

long white hair. He is dressed in the costume of a Doctor of Medicine, and beneath is written, "Paul Chamberlin, M.D., 1658." Now Paul Chamberlin was a notorious quack, who promoted the sale of the celebrated anodyne necklace for children's teeth, women in labour, and distempers of the head.

FIG. 78.—Dr. Peter Chamberlen (Aveling).

and who pretended to believe so completely in the efficacy of its "alcalious atoms and effluvian" that he constantly wore one on each leg by way of garters to keep off cramp. If this likeness were really that of Paul, our interest in it would be very slight; but it is evident some mistake has been made, and we think it will not be difficult to prove that the person represented is Peter, the inventor of the midwifery forceps. The date of the portrait, 1658, and the apparent age of the person portrayed, are so at variance with facts that it is impossible to reconcile them. Paul Chamberlen, not Chamberlin,

as it is spelt under the engraving, was the second son of Peter, who was born in 1601. The age of Paul therefore in 1658 would be about thirty, and that of Peter fifty-seven. No one can imagine the portrait to be the likeness of a young man, but all would probably agree in admitting that it might represent a man of about sixty, or even older. The error in naming this portrait has probably been made by the engraver, for his sketch, taken from the original painting, is in the possession of the Royal Medico-Chirurgical Society, and has the same inscription. Medically the Chamberlen family is as interesting as it is puzzling genealogically. Four generations were physicians and surgeons, and three of them were of sufficient eminence to be appointed in ordinary to the reigning monarchs. First there were two surgeons: Peter the elder, surgeon to Queen Anne, wife of James I., and Peter the younger, a surgeon in Black-friars, who married Sarah, the daughter of William de Laune, minister and physician. Peter Junior had a son Peter the forceps inventor, and he had three sons who took the degree of Doctor of Medicine—Hugh, Paul, and John. Hugh had a son also called Hugh, a celebrated physician, who was buried in Westminster Abbey, where a handsome tomb to his memory, erected by the Duke of Buckingham, may be seen. From this slight sketch of their pedigree it will be easily understood how readily mistakes may arise. It still, however, remains a mystery how the name of Paul should have supplanted that of Peter, for the instance of the portrait is not unique. In the systematic writings on midwifery of some of our most reliable authorities Paul Chamberlin is stated to be the inventor of the forceps. This error has been completely exploded by the finding of the original models in Peter's house after his death, and by the fact that whereas Paul was a miserable quack, Peter was a man of great genius and the patentee of the several inventions. All the medical members of the Chamberlen family practised as obstetricians. The history of its four generations would therefore embrace a period of more than a hundred years—a time most interesting to us, inasmuch as during it, midwifery was rescued from the hands of ignorant women and placed on a scientific basis. A

biographical memoir of this interesting family seems to be a desideratum, not only that we may be able to know Paul from Peter, but as an important chapter in the history of our branch of the profession."

The following note of the Chamberlen family, written by J. W. Ballantyne, M.D., F.R.C.P.S., is reproduced from the Journal of Obstetrics and Gynæcology of the British Empire 1908, Vol. XIII, 161:—

Having recently, through the kindness of a friend, been put in possession of an engraving of a portrait of one of the Chamberlens, I was led once again to look into the history of this remarkable family of obstetricians. Notwithstanding the admirable work of Dr. Aveling (The Chamberlens and the Midwifery Forceps) there are still several problems concerning the Chamberlens which have never been satisfactorily elucidated and the engraving to which I refer, and which is here repreduced (*vide* plate) is associated with one of them.

It is entitled "Paul Chamberlen, M.D., 1658: from an original drawing," and it carries the information that it was published May 30th, 1794, by W. Richardson, Castle Street, Leicester Square. The name R. White, which appears on the engraving was doubtless Robert White, a draughtsman and engraver who lived between 1645 and 1703. (See, Dict. Nat. Biography, Vol. LIX, p. 73). It represents a man with well-marked features, and with flowing locks resting on his shoulders; the face is that of a man of at least middle age. When, however, one refers to the history of the Chamberlens, and specially of Dr. Paul Chamberlen, one finds it difficult to make the facts fit the portrait; for in 1658, the date of the picture Paul Chamberlen was only twenty-three years of age, having been born in 1635, and the face in the picture is that of a man much older than twenty-three. At first I was not inclined to think much of this discrepancy, believing it to be due in all probability to an error in dating the engraving ; but, wondering if Dr. Aveling had noticed the want of agreement between the appearance of the face in the portrait and the age stated, I looked up his work, (op. cit., p. 30) and there found this interesting foot-note: "This portrait is taken from a well-

known engraving, beneath which is 'Paul Chamberlin, M.D., 1658.' It is really the likeness of Dr. Peter Chamberlen, for at this date Paul was only 23 years old, while the former was 57, which age corresponds precisely with the features represented above." According to Dr. Aveling, therefore the portrait represents not Dr. Paul Chamberlin but his father Peter Chamberlen.

Dr. Paul Chamberlen was not a conspicuous member of the family, save for a certain notoriety in connection with the recommendation of an "Anodyne Necklace" to be worn by children during dentition, he is almost unknown to fame. He had, however, a brother Hugh, known as "Hugh Chamberlen, Senior," who seems to have inherited the Chamberlen genius. At any rate, he was the author of various proposals for a new establishment of physic ("for the better securing of health"), for a Land Bank ("to make England rich and happy"), and for the Union of England and Scotland. Of all his schemes, however, the only one to be realized was the last named; but it is not known if he was alive at the time when the union was consummated, for soon after 1702 he went to live in Holland, and is heard of no more. It is upon a statement made by Dr. Hugh Chamberlen that the belief that the midwifery forceps was invented by his father, Dr. Peter Chamberlen, is founded. I must now refer to this Chamberlen (Dr. Peter) from whom Dr. Hugh inherited not only the forceps but also that genius for making proposals for the health and happiness of the country to which I have already alluded.

Dr. Peter Chamberlen, who is, according to Dr. Aveling represented in the accompanying portrait, was the third son of the name of whom we have any information. William Chamberlen fled to England from Paris in 1569, for he and his wife were Huguenots. They had several children including *two* named Peter; they had been named Peter Chamberlen the elder and Peter Chamberlen the younger. Dr. Peter Chamberlen the younger, who, in association with his brother, attempted to carry out a scheme for the incorporation of Midwives (an attempt, made nearly three hundred years ago, to do in some measure what the Midwives Act of 1902 is now doing) had a large family, the eldest child being Dr. Peter Chamberlen,

third of the name. This member of the Chamberlen family therefore, was grandson of William, nephew of Peter the Elder and son of Peter the younger. He was born in London in 1601 and died at Woodham Mortimer Hall, near Maldon in Essex in 1683, at the advance age of 82. If the accompanying engraving indeed represents Dr. Peter Chamberlen, and if the date (1658) attached thereto be that of the year in which the portrait was painted, then it must have been executed when the Doctor was 57 years of age, "which age" as Aveling says, "corresponds precisely with the features represented."

There can be no doubt that this Peter Chamberlen was the most distinguished member of the family. He received the degree of Doctor of Medicine at the university of Padua at the age of eighteen; soon after his return to London he was admitted to the fellowship of the college of Physicians; he became Physician extraordinary to the king (Charles I), to whom the Czar of Russia wrote begging him to allow the doctor to come to Moscow and his service; he brought forward once more the scheme for the Incorporation of Midwives which his father had mooted but with no better success; he advocated the use of "Baths and Bath-stoves" for the cure of diseases and the preservation of health: he had ideas on phonetic writing embodied in a project for "a new art or way or writing and printing true English, whereby better to represent to the eye what the sound doth the ear"; and he had a project for the reconciliation of the churches whereby he hoped that a union of the Jewish religion with all the Christian sects into one single church would be effected. Perhaps the most interesting of all his schemes to us who live in the days of motor cars and automobiles was his proposal for propelling carriages and ships by wind, "to make Coaches, Waggons, Carts, Ploughs, etc., to go by Engine without horses", and "to be able to navigate with all winds in a Straight Line." I imagine that if Dr. Chamberlen could now revisit Ludgate Hill and take note of the traffic he would think that his dream of the horseless carriages had been fulfilled. That Dr. Chamberlen also invented the midwifery forceps was long believed, but Dr. Aveling's researches seem to show that he only inherited the

instrument from his father (Peter Chamberlen the Younger) or, more probably, from his uncle (Peter Chamberlen the elder). But even if this honour be taken from him and given to another member of the family, Dr. Peter remains a most interesting personality.

Since Dr. Aveling wrote his book on the Chamberlens some further investigation of the family's history, and more specially of the life and travels of Dr. Peter Chamberlen, has been undertaken. Dr. Scarffenberg,* knowing that Dr. Peter had dealings with the Swedish and Danish Governments in regard to his wind-impelled carriages and other inventions, has investigated the archives of these countries, and has found that the English obstetrician obtained a patent from the former Government in 1669, and from the latter in 1670. It is probable that he personally visited Sweden and Denmark. Dr. Scarffenberg has found that a Thomas Chamberlen died in Denmark in 1671 and he regards this Chamberlen as probably a son of Dr. Peter. In Holland also there are traces of Chamberlen family, and possibly the Dutch archives may contain interesting information regarding the subject of this short note. Dr. Scarffenberg believes that he suffered from mania, and he comes to the conclusion that the specific type was *paranoia inventoria et religiosa,* founding his opinion on the fact that he ventured to conceive the possibility of a union between the various Christian churches and the Jewish, a somewhat insufficient reason in itself."

Hugh Chamberlen, Senior.

He was probably born about the year 1630. No record exists as to the places and manner in which he was educated and although he is constantly called Dr. Hugh Chamberlen, no evidence can be discovered of his having taken a degree in Medicine.

Hugh Chamberlen visited Paris in 1670 with the hope of realizing a fortune by the invention. He sought Mauriceau a

*Scharffenberg. Norsk Mag. f. Laegevidenskaben, 1902, Vol. lxiii, p. 419.

famous obstetrician of that day and begged a trial of his instrument. As chance would have it, Mauriceau had a difficult case under his care at that time which he failed to deliver. This was a woman, a rhachitic dwarf æt 38 who had been in labour for 8 days. Hugh Chamberlen undertook to deliver this women in quarter of an hour. After three hours of violent effort he desisted from exhaustion. Mother and child did not survive twenty-four hours and postmortem examination revealed a ruptured uterus. With surprising boldness he revisited Paris six months after this failure and proposed to sell his secret to the Prime Minister for a large sum. Notwithstanding his failure, however, he maintained friendly relations with Mauriceau, and on returning to England translated Mauriceau's book* into English.

In the preface to the English translation† he refers to the forceps in the following words: "My father, brothers and myself (tho' none else in Europe as I know) have by God's blessing and our own industry, attained to and long practised a way to deliver women in this case without any prejudice to them or their infants; tho all others (being obliged, for want of such an expedient, to use the common way) do and must endanger, if not destroy one or both with hooks. By this manual operation, a labour may be dispatched (on the least difficulty) with fewer pains and sooner, to the great advantage and without danger both of woman and child."............... "In the 15th Chapter of this book, my author proposes the conveying sharp instruments into the womb, to extract a head, which is a dangerous operation and may be much better done by our forementioned arts...............I will now take leave to offer an apology for not publishing the secret I mention we have to extract children without hooks, where other artists use them, *viz.*, there being my Father and two Brothers living, that practise this art, I cannot esteem it my own to dispose of nor publish it without injury to them; and think I have not been unservicable to my country, altho I do but inform them that

*Observations sur la grosse. Paris, 1694, in 4°, observ. XXVI, p. 23.
†The diseases of women with child and in child-bed, London 1672, in 8°.

the forementioned three persons of our family and myself, can serve them in these extremities, with greater safety than others."

Hugh Chamberlen. From my house in Essex buildings.

In order to explore a new field of gain Hugh Chamberlen visited Amsterdam in 1693 and became intimate with the famous accoucher Roger Roonhuysen to whom he communicated his famous secret and his manual operation. He probably died in Holland as no trace of his will or report of his death is to be found in England.

Dr. Paul Chamberlen.

(Born 22nd October, 1635—Died. (?).

He was the second son of Dr. Peter Chamberlen and practised in London as a man-midwife, being in possession, as his brother Hugh informs us, of the family secret and using the forceps in difficult cases of midwifery. He was in medicine a quack and is best known as the inventor of the "Celebrated Anodyne Necklace, recommended to the world by Dr. Chamberlen for children's teeth, women in labour, etc." He had one son Paul.

The will of "Paul Chamberlen M.D." is dated May 24th, 1713 and was proved by his relict Mary on December 19th, 1717.

Dr. John Chamberlen.

He was the fourth son of Dr. Peter Chamberlen and in common with his brothers Hugh and Paul possessed the family secret and practised Midwifery. He appears to have been a Doctor of Medicine.

Hugh Chamberlen, Junior.

(Born 1664—Died 17 June, 1728).

He was the eldest son of Hugh Chamberlen, senior. He was created Doctor of Medicine at Cambridge on 8th October, 1689, and was admitted a Fellow of the College of Physicians on 2nd April, 1694. He succeeded in establishing himself not

only as a popular obstetrician but as a trustworthy physician, and he practised as both among the higher classes of society.

Among his patients and friends none had a higher esteem for Hugh Chamberlen Junior than John Sheffield, Duke of Buckingham and his Duchess. After the death of the Duke, Hugh Chamberlen Junior lived on the most intimate terms with Catherine, Duchess of Buckingham. It would appear that during the latter years of his life Hugh Chamberlen Junior lived at Buckingham House and died at the house.

FIG. 79.—Hugh Chamberlen Junior (Aveling)

In an obituary notice of Hugh Chamberlen Junior, published in "The Country Journal or the Craftsman" Saturday, June 22nd, 1728, the following appears: "He was the last of that ancient family who practised the Art of Midwifery in the Kingdom except Dr. Walker in Great Suffolk Street, who is Grandson to Dr. Peter Chamberlen."

According to Dr. William Douglas this Dr. Walker was the inventor of the English lock of Midwifery forceps, for in

his letter to Smellie, he says, "Dr. Walker pretended to improve Dr. Chamberlen's forceps but in truth spoil'd them by making them *male* and *female*." (A letter to Dr. Smellie, etc., 1748, p. 8).

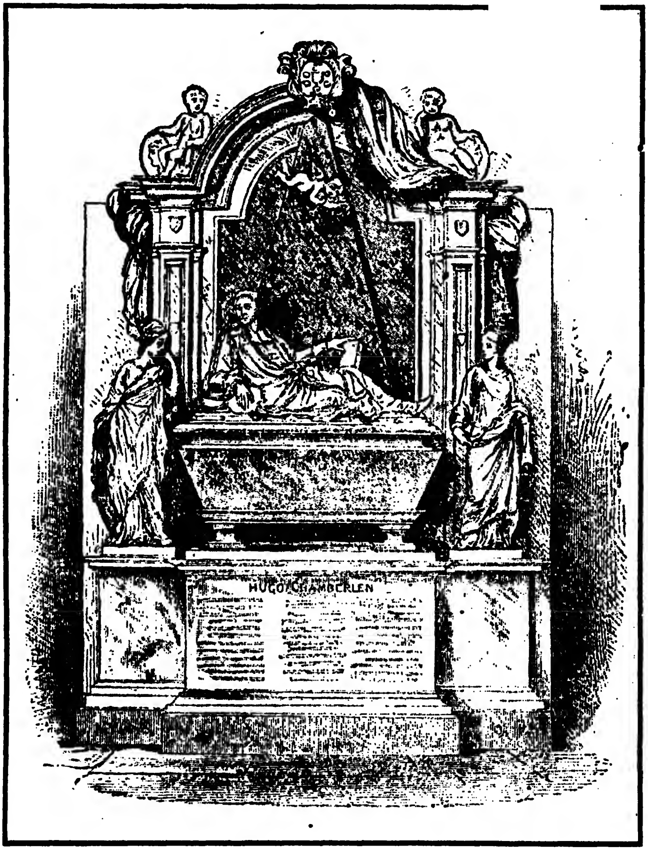

FIG. 80.—Cenotaph of Hugh Chamberlen Junior (Aveling).

Bishop Atterbury wrote an Epitaph,* which was engraved upon a magnificent cenotaph erected, doubtless at the suggestion of his mother by her youthful son Edmond, Duke

*Aveling, p. 197.

of Buckingham. It was placed in the north aisle of the choir in Westminester Abbey.

"The monument of Hugh Chamberlen M.D. which is the first that engages attention on the south side, is a very handsome composition of white and variegated marbles. It principally consists of an inscribed basement, a sarcophagus, several figures, a pyramid and a circular pediment (with mantling) rising from pilasters of the Doric Order. On the sarcophagus is a finely executed statue of the deceased in his Doctor's gown, reclining upon a mattress; his right arm being supported by cushions and his hand extended on his cap; in his left hand he holds a book which also rests upon his knee. There is much ease and gracefulness in the position of this figure; the features are expressive and penetrating and the drapery well cast. At the sides of the sarcophagus, on receding pedestals are statues of Health and Longevity; the cup and serpent which distinguishes the former are now broken; the latter is resting her right hand upon a shield, on which are sculptured a lion couchant and a soaring eagle. On the pyramid is a winged boy or angel, bearing a wreath and a trumpet and two other boys are seated on the ascending sides of the pediment, each upholding a medallion of a female. The sculptors were Peter Schumakers and Lawe Delvaux."

Aveling described chronologically the memorials of the Chamberlen family a resume of which is given above and then offered criticisms on the invention of the midwifery forceps founded upon facts derived from the memorials. He endeavoured "to point out which of the Chamberlens was the originator of this most beneficent of instruments and to show that the member of the family who is now most commonly looked upon as the inventor has no right to the honour."

He says, "It is beyond doubt a fact that Arabian surgeons used forceps to deliver the fœtal head in difficult labours. Avicenna mentions them and Albucasis gives drawings of barbarous instruments which were invented to be used as cranioclasts. It is not however proposed to consider these or any other evidences of the existence of midwifery forceps in remote times, for to whatever state of perfection they might have been

brought, all knowledge of them had for centuries been lost and reinvention had become a necessity."

"Nor will the question be considered whether Rueff has any right to be looked upon as the inventor of midwifery forceps or rather its prototype for he has no such claim."

It is not intended to consider the claims of other supposed inventors of the midwifery forceps, for the memorials of the Chamberlen family irresistably prove that to one of these four generations of obstetricians, the honour of the invention belongs. One question alone is left to be solved—which of the Chamberlens was the inventor?

To answer the question satisfactorily, it will be necessary to begin with the time when the knowledge of the midwifery forceps had become general and then endeavour to trace the history of the invention back to the inventor.

It was not till the beginning of the eighteenth century that the secret of the Chamberlens began to be known. Edmund Chapman published an account of the midwifery forceps in 1733, "and stated that there were different sorts of forceps" and that they were "well-known." Evidently the secret had been discovered much earlier than 1733, as Chapman used them "for some years."

"It is not improbable that William Sermon knew something about midwifery forceps" as he writes "but when it falleth out that none of these medicines shall take effect there are several other ways,.........as the crotchet, hooks *tongs* and other instruments. ("English Midwife" 1671 Chap. xxv., p. 141).

"It is, however quite certain that during the first half of the eighteenth century the construction and use of the midwifery forceps had become well known. Fielding Ould writes in 1742, "The best adapted instrument is the large forceps, which is in general use all over Europe" (A Treatise of Midwifery, Dublin p. 153).

The most important link in the chain of evidence was the discovery of the Chamberlen instruments in the Woodham Mortimer Hall in 1818. Mr. H. H. Carwardine, in presenting the obstetric instruments of the Chamberlens to the Royal

FIG. 81.—Woodham Mortimer Hall (Aveling).

Medical and Chirurgical Society of London offered the following facts and observations which may serve to authenticate their genuineness and their originality.—"The estate of Woodham Mortimer Hall, near Maldon in Essex, was purchased by Dr. Peter Chamberlen sometime previous to 1638 and continued in his family till about 1715, when it was sold by Hope Chamberlen to Mr. William Alexander, wine merchant, who bequeathed it to the Wine Coopers' Company. The principal entrance to the mansion is through a porch, the masonry of which being carried up with the building, serves as closets to its respective stories. Two or three years ago, a lady with whom I am intimately acquainted (and from whom I had the particulars) discovered in the floor of the upper closet a hinge, and tracing the line she saw another, which led to the obvious conclusion of a door; this door she soon found means to open. There was a considerable space between the floor and ceiling below, and this vacancy contained divers empty boxes, etc. Among these was a curious chest or cabinet, in which was deposited a collection of old coins, trinkets, gloves, fans, spectacles, etc., with many letters from Dr. Chamberlen to different members of his family and also the Obstetric instruments. Being on terms of intimacy with the family resident at Woodham Mortimer Hall, these instruments have been presented to me and I have now the gratification of depositing them with your Society for the gratification of public curiosity and to secure to Chamberlen the meed of posthumous fame due to him for his most useful discovery."*

Additional information concerning this discovery was obtained by Dr. Robert Lee from Dr. May who writing from Maldon on the 6th July 1861 says: "The following account of the discovery of Dr. Chamberlen's instruments in June 1818, I have received from Mrs. Codd, now a resident in Maldon who was at the date mentioned and for several years previous resident at Woodham Mortimer Hall her husband being the occupant of the place. Mrs. Kemball, the mother of Mrs.

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*Medico-Chirurgical Transactions vol. ix. part I, 1818, p. 81—84.

Codd being on a visit to her daughter in the year mentioned, happened to go into a closet above the entrance porch. She was struck with the appearance of a cork or a small disc of wood—Mrs. Codd forgets which—in the floor; a second one was then noticed on a level with the boards. On investigation these were found to cover each a screw head. On pursuing the enquiry, a trap-door, with small sunken hinges, was noticed; on elevating this a cavity between the floor and ceiling was brought to view. This contained some boxes in which were two or three pairs of the midwifery forceps, several coins, a medallion of Charles I, or II., a miniature of the Doctor damaged by time, a tooth wrapped in paper, written on, 'My husband's last tooth'; some little antique plate; a pair of lady's long yellow kid gloves, in excellant preservation; a small testament date 1645. These three latter articles I have seen in Mrs. Codd's possession. The space under the floor is about 5½ feet square and about twelve inches in depth. There are two pieces of iron projecting from under the boards, with holes in them for the reception of the screws in the trap. This remains now in the same condition as it was when discovered forty-eight years ago. The concealment was evidently made subsequent to the death of Dr. Chamberlen, which occurred in 1683 as the testament above alluded to bears a manuscript date of 1695. The instruments were taken possession of by Mr. Carwardine, a friend of the family, then a practising surgeon, now retired and residing at Earl's Colne Priory, in this County. That gentleman took them to London and presented some of them either to the Medical and Chirurgical Society or one of the Hospitals."*

The discovery of these instruments in the house of Dr. Peter Chamberlen makes it clear that the last two generations of the Chamberlen family have no claims to be considered inventors of the midwifery forceps.

The generally received opinion before Aveling's researches were published in 1882 has been that Dr. Peter Chamberlen invented the midwifery forceps but the conclusion has been

*Medico-Chirurgical Transactions. Vol. xxvii.

arrived at upon insufficient grounds, for the evidence supplied by the above "Memorials" unmistakably suggests that he like his descendants received his knowledge of the midwifery forceps from his father.*

It is important to note the curious fact that, of the instruments discovered in Dr. Peter Chamberlen's house, there were three specimens of each class (Levers, Crotchets, Fillets and Forceps). It is true there were four forceps, but one was of such rude construction as to be scarcely practically useful. The rational and inevitable explanation, therefore, of this remarkable coincidence must be that the instruments found were those not only of Dr. Peter Chamberlen but of his father and uncle, for the secret could scarcely have been kept, if at the death of the two latter obstetricians, their instruments had been allowed to fall into any other hands than those of Dr. Peter Chamberlen. Moreover there is evidence that he was very early in life, in possession of the secret which gave him a superior position as an obstetrician.

Again, Hugh Chamberlen, senior, in the preface to his translation of Mauriceau says, "My father brothers and myself have *attained to* and long practised a way to deliver women." He does not say "*invented* and long practised a way to deliver women," which would probably have been his mode of expressing himself had his father been the inventor; and lastly we have the strongest corroborative evidence that the secret of the midwifery forceps was communicated to Dr. Peter Chamberlen from his own writings for in his "Voice in Rhama" he says "Fame begot me envie and secret enemies which mightily increased when my father added to me the knowledge of deliveries".

"There is also undeniable evidence in the "Annals of the Royal College of Physicians of London" that Dr. Peter Chamberlen's father and uncle possessed exclusive and superior skill in the treatment of difficult labours. When Peter Chamberlen the younger endeavoured to incorporate the midwives of London, his project was opposed by the College

*Chereau believed that he is the real inventor. *Vide*, Art. Forceps, Dictionnaire Encyclopædic des Sciences Medicales.

and at one of their meetings he was asked whether, in spite of his boast that he and his brother and none others, excelled in the management of difficult labours, any member of the College would not answer and judge more correctly than any obstetric surgeon whatever.* This query appears to have been suggested by a feeling of annoyance at the assumption of superior skill by the brothers and certainly proves that they were in possession of some secret method of practice, which they believed enabled them to treat difficult labours in an exceptionally advantageous way. Can there be any doubt as to what this secret method was? And is it likely they would have reached the eminence they undoubtedly attained had they not been in possession of superior skill in their profession? Everything was against their success. As foreigners they were suspected and hated and as refugees they were dispirited and poor. Skill, industry and energy could alone have enabled them to surmount the difficulties which everywhere presented themselves; yet in spite of all these disadvantages, Peter Chamberlen, the elder was selected to attend the Queen in her confinements, and both brothers secured powerful friends, raised themselves to honourable positions and amassed considerable wealth.

Having arrived thus far in the chain of evidence, the only question now left to decide, is which of the brothers invented the midwifery forceps? Strangely enough, having reached this point, independently of further evidence, a line in the introduction to Smellie's Midwifery, which had hitherto received from no one either attention or comment, came like a welcome flash of light in hopeless darkness and as completely as it is ever likely to be, cleared up the mystery. In speaking of the instrument used by the Chamberlens, he adds "and said to be contrived by the uncle," "The Uncle" can mean no other person than Peter Chamberlen, senior, for Dr. Peter Chamberlen had no brother practising as an obstetrician. As far therefore as can be determined by existing evidence, Peter Chamberlen senior, may with absolute certainty have the honour

*Annals of the College, February 21st, 1616.

conferred upon him of being the inventor of midwifery forceps. It is to be noted that in 1612 he was released from prison through the intervention of the Queen, no doubt for having attended in her confinements. It must therefore be presumed that at that time he must have acquired considerable reputation in the practice of midwifery, most probably due to his secret skill in difficult labour. It would be reasonable to assume that he invented the forceps certainly in 1600, and in all probability some years before.

The Chamberlens have been unmercifully censured for having kept the invention of the midwifery forceps a family secret. Chereau says, "they possessed a method of delivering a woman with safety and yet to their shame be it said, they kept it as a secret for the sole purpose of monetary gain making it a subject of a disreputable trade comparable to that of a candle-seller or a grocer." Aveling however observes that "it is not fair to judge members of our profession who lived two hundred years ago, by the code of ethics which medical men now accept. At that time, the possession of a nostrum was not looked upon as degrading or derogatory to its owner; and the custom of not publishing secret modes of practice was very common. Only a little more than a hundred years since, Smellie writes "I have heard a gentleman of eminence in one of the branches of medicine, affirm that he never know one person of our profession who did not pretend to be in possession of some secret or another". When the forceps was invented, the age delighted in mystery. No physician was considered accomplished in his art who knew nothing of astrology. The public readily believed in medical marvels and resorted much to pretentious quacks, many of whom had special protection and privileges granted them. All that can be fairly said against the Chamberlens is, that they were no better than their neighbours, and that they failed to recognise the obligation imposed upon all members of our noble profession of publishing freely and immediately any new method of alleviating human suffering, which by their industry or genius they may have been able to discover."

DESCRIPTION OF THE CHAMBERLEN FORCEPS.

No. 1. A very rudely constructed forceps, one half 12½ inches, the other, 13 inches long; the length of blade to joint in both 8 inches; the length of fenestrum in one blade 5 inches, in the other 8 inches. One handle is 4½ inches and the other 4 inches long and both terminate in blunt hooks bent outwards. The two portions of the instrument are united by means of a rivet, which can be unscrewed. Its head has not the usual notch in it, but is made oval. The apices of the blades, when the instrument is closed, touch one another.

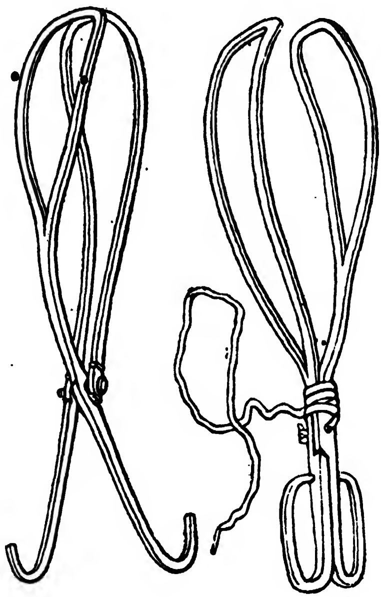


FIG. 82. FIG. 83.

FIG. 82.—Chamberlen Forceps No. I (Aveling).
FIG. 83.—Chamberlen Forceps No. II (Aveling).

This was doubtless the first midwifery forceps, constructed by the Chamberlens and from which spring all the various forms now in use.

No. 2. Forceps, 12 inches long; the length of blade to joint 9½ inches; the length of fenestrum in one blade 8½ inches,

in the other $5\frac{1}{4}$ inches; the breadth of fenestrum in the former $1\frac{1}{4}$ inch, in the latter $1\frac{1}{8}$ inch. The handles are $3\frac{1}{4}$ inches long and looped large enough to admit two fingers on one side and the thumb on the other. The two portions of the instrument are united by means of a braided cord having a knot at one end and a tag at the other. This is passed through the apertures usually occupied by a rivet and enables the operator to unite or disunite the two portions of the instrument.

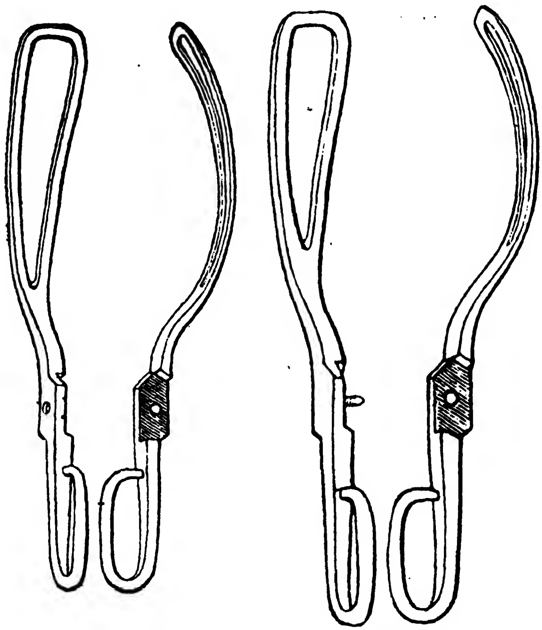


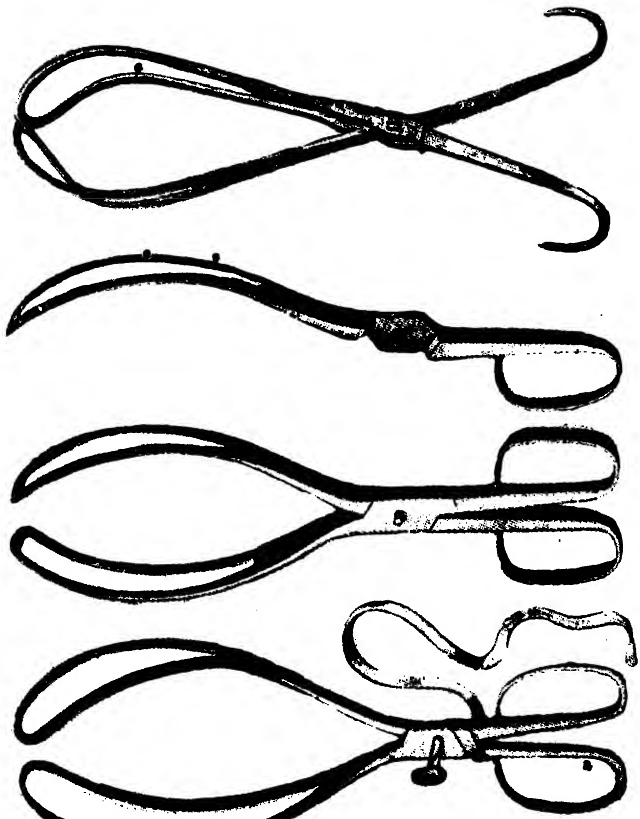
FIG. 84. FIG. 85.

FIG. 84.—Chamberlen Forceps No. III (Aveling).
FIG. 85.—Chamberlen Forceps No. IV (Aveling).

No. 3. Forceps, 12 inches long, similar in construction to the last, except that the fenestra are of equal size—6 inches long and 1 inch wide.

No. 4. Powerful forceps, 13 inches long; the length of blade to joint 8 inches; the length of fenestrum 5 inches and breadth 1 inch. The handles are looped and 5 inches in

length. The two portions of the instrument may be united by means of a rivet fixed in one half and fitting loosely into a perforation in the other. The divergence of the apices when the instrument is closed is $1\frac{1}{4}$ inches.



89.—Chamberlen's Forceps. (Kilian).

Chereau makes the following remarks:—"In all these forceps, the blades were fenestrated and when the branches were joined, it resembled a pair of ordinary scissors. One of these was at least 12 inches long, another one, was evidently unfinished in construction, a third one was of curious pattern, there being an attempt to find some method of articulating the

two branches so that they may be separated at will". These instruments were studied by Rigby in 1833,* who had them sketched and maintained that these were the very instruments used by the Chamberlens. Killian† also in 1856 represented three models of Chamberlen forceps and stated, without hesitation that these were the original models used by Chamberlens. Apart from the romance of the discovery, it must be admitted that the last model, as indicated by two such men as Carwardine and Rigby, deserves all the credit. Moreover the discovery of the instruments was corroborated by valuable documentary evidence, which proves beyond doubt that the Chamberlens were sworn enemies of sharp hooks of all kinds and were the first to employ forceps. Apparently their first idea was to use simultaneously two blunt hooks which they afterwards modified and joined together in a kind of tongs to form the real forceps. It may thus be seen that the forceps descended from hooks which were sharp and pointed and could only be used to extract a child after mutilating it. Later on, accoucheurs hoped to extract a living child by these hooks and with that object in view, made the hooks blunt and also gave them the shape of a spatula and going so far as to fenestrate its broad portion. It soon became evident, that the head could not be pulled out with a single hook, whereupon two hooks were used simultaneously and later on fastened together by a twisted ribbon round the handles; in short, they tried various ways of joining the two hooks together at first fixing them together before introduction and later on evolving a method of joining after the hooks were introduced separately and in position. It is believed that the Chamberlens must have made successive attempts like these, until they succeeded in making the most perfect models that had been found in the house at Woodham. In spite of their attempts to keep the secret as closely as possible it did not fail to ooze out. Although they did not allow doctors to see the operation, there were the assistants, the parents and the patients themselves who did not fail to get some clue to this secret method of assisting delivery

*The Edinburgh Medical and Surgical Journal, Vol. XI 1833, p. 339.
†Armamentarium Lucine Novum, 1856, plate XIII.

and convey the information to other accoucheurs who were extremely jealous of Chamberlen's wide reputation.

It is quite certain, however, that at the period when Chamberlens lived, other practitioners also had employed the forceps, *e.g.* the English obstetrician Drinkwater who used to practise at Brentford. Mulder gives the date of the invention of his forceps as 1668.

Thus Drinkwater was another claimant for the early use of forceps in England. He was a surgeon and man-midwife of Brentford, commenced practice in 1668 and died in 1728. He left a pair of forceps which came into the possession of Dr. Robert Wallace Johnson a student of Hunter and who mentions it, in his "A New system of midwifery" published in 1769. The instrument resembled those of Chapman and Giffard, except that the hooks of the handles were bent outward, as in those of the present day. There was no diagram of the forceps. As Mr. Drinkwater was an octogenarian when he died, it is probable that he had been in the secret for some years. Among the many Chamberlens, it appears that it was impossible to keep the secret a purely family one beyond a certain period. When the last of the Peters died and his three sons held the secret there must have been a leak somewhere. Possibly death may have given up a pair of forceps, as in the Drinkwater case."

Thus there was a contemporary of Hugh Chamberlen, in possession of a useful forceps. Haller* shows that **Cornielle Van Salingen,** a surgeon at the Haye, who was himself a manufacturer of surgical instruments, mentions, in his work Embryulcia published in 1673, a forceps to extract the child but gives no description of the instrument nor of the method of use. **J. Adrien Slevogt,**† professor at Jena, mentions in 1709 of a forceps which he used to employ. Several writers deny that the Chamberlens were the real inventors of the forceps and it will presently be seen that Hollanders claim that glory. Exton‡ in 1752 goes so far as to state that the "manual

*Bibl. chir t, 1. p. 412.
†Slevogt. De instrumentis Hippocratis chrurgicis hoclve ignoratis.
‡A new and general system of midwifery in 8o.

operation" of the Chamberlens was only a particular manner of performing version, which was very little known in England in the 17th century. But this interpretation falls to the ground when one refers to the seventeenth chapter of Mauriceau's Traite des accouchements translated by Hugh Chamberlen. This chapter is entitled "On the manner of extracting the child when it is too bulky or the passage is too narrow". The translator in a note, says "This chapter could very well be left out, if all the practitioners knew the art, which the translator alluded in his preface, of extracting the child without hooks or turning it". It is apparent then that his method was not version. On the other hand Groenevelt* states that on 17th September 1697 Hugh Chamberlen made use of the *Speculum Matricis* to extract a child. This speculum Matricis was evidently the forceps.

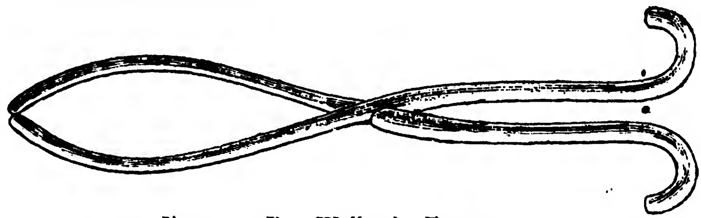


FIG. 90.—Dr. Walker's Forceps.
From a pair in the Edinburgh Obstetrical Museum.
(A. R. Simpson).

Sir Alexander Russell Simpson in his inaugural address to the Midland Medical Society at Birmingham on 26th October, 1900, on the invention and evolution of the Midwifery forceps, published in the Scottish Medical and Surgical Journal, December, 1900, stated that, "a forceps of somewhat similar pattern (*i.e.*, to those of Chapman) but having a different kind of lock may well have been the instrument employed by Dr. Walker (?1740), the last survivor of Dr. Peter Chamberlen's obstetric progeny (Fig. 90 also Fig. 138 of unknown forceps in Mulders). For William Douglas avers that this "Dr. Walker pretended to improve Dr. Chamberlen's forceps, but in truth spoiled them, by making them male and female."

*Tutus cantharidarum in medicina uses internus, 2 edit London 1703 in—12. Historia nona p. 128.

Finally, it may be asked, how did the secret of the forceps finally become known? The reviewer of Aveling's book on "The Chamberlens and the Midwifery Forceps" in the American Journal of the Medical Sciences for April, 1883, answers the question as follows: "This can only be answered in a measure. After the signal failure of Hugh Chamberlen at Paris in 1670, he settled in Amsterdam. The sale of the secret of his forceps to Roonhuysen is generally dated at 1688 which is probably an error, as he was then in England. After he parted with his secret to relieve his necessities, it was sold and resold as such among the Hollanders for many years. The first revelation of the plan of delivery openly made for the benefit of science and humanity was that of Professor Palfyn of Ghent, who, in 1721, exhibited before the Royal Academy of Sciences an arrangement of parallel roundhandled non-fenestrated vectes, there amusingly denominated "the hands of Palfyn." The Professor was evidently not fully in the secret; he had obtained the idea possibly from a midwife but not having seen the instrument, did not know of the fenestræ and how to make the blades independent and antagonistic at will; so he bound the handles together, after having introduced the blades separately.

Although the idea then became known in France, the real secret was evidently not in the exclusive keeping of the Chamberlens in England at the date given. The first publication in England which gave pictures of the forceps was the posthumous work of Mr. William Giffard, Surgeon and man-midwife of London published in 1734 by Mr. Edward Hody. In this work on midwifery is the report of a case in which he used his *"extractors"* in 1726. To Mr. Edmund Chapman, of South Halsted, Essex, is generally awarded the priority, but his little book of 1733 contains no illustrations, these having been supplied in the second and larger edition of 1735, after the appearance of Giffard's Midwifery and the paper of Butter referred to in foot-note No. 1, who condemned him for not having done so. To Chapman however is due the credit of having mentioned the kind of instrument which constituted

the secret of the Chamberlens, before any one had *openly* published it. In his book of 1733 we find the following:—

"There are several different sorts of forceps"............"all far from being equally proper; and great regard is to be had to their form."......................The secret intimated by Dr. Chamberlen, by which his father, two brothers and himself saved such children as presented with the head but could not be born with natural pains was, as is generally believed, if not past all dispute, the use of the forceps *now well-known to all principal men of the profession both in town and country.*" Chapman must even then (1733) have somehow been long in the secret, as he says: "For *many years* my forceps happened to be made of so soft a metal as to bend or give way or suffer some alteration in their curve. They were made as usual with the screw fixed to one part or side of them. These I used *for some years,* but they often happening to slip off sideways, as before mentioned, my opinion of the instrument was so much lessened, that for *many years* after, I used it but seldom, and even *not once for the space of ten years.*" Put all these expressions of time together, and Mr. Chapman must have used the forceps long before the date (1726) given in the case of Mr. Giffard of London. William Sermon in his "English Midwife" 1671 in speaking of the delivery of the fœtus after its death, mentions as extractors, "the crotchet, hooks, *tongs,* and other instruments." It may be asked, what did he mean by the term "*tongs*"? Some have supposed that from this, he may have known of the forceps; but there were instruments then in use for the purpose mentioned, that were quite as entitled to this name, as the forceps. Had he been at that time in the secret, he would in all probability, have made capital out of it, in writing his manual for midwives as it was considered quite legitimate in his day, to take every advantage of a discovery and every physician "was said to have his secret."

In conclusion, the following interesting account of the history of the midwifery forceps, compiled by Thomas More Madden and published in the Indian Medical Record, 1898, XV, pp. 4 to 8, may be quoted. Madden took his citations, as far as possible, from the original authorities and did not

borrow, as most authorities have done, from Mulder's Historia. Neither did he reproduce Mulder's quotations at second-hand.

The earliest English reference to the use of any instrument, (midwifery forceps) is contained in James Cook's Mellificum Chirurgæ or "Marrow of Chirurgery," the first edition of which was published in 1647, and is quoted in Dr. Aveling's interesting "Biographical Sketches of British Obstetricians," in the Obstetrical Journal for October, 1873.

"Being commanded by the Lady Dowager Brook to wait on her to London, to take the consult of physicians, in the way before we came to Tossiter, we met with the tidings of that fatal fire of London, which caused her honour to resolve for Hackney. After some time of her being there I was desired by Mrs. Hatton to go visit one, near her time of her first child, who was aged. She begged of me to come to her if there was need. I told her there were several men abler than myself and fitted with instruments which I wanted, which might be had from the city (doubtless, here, says Dr. Aveling, he refers to Paul Chamberlen). After two or three days, in the night she sent for me. I being very much indisposed, and the night tempestuous, I denied; but, being very much importuned by a gentleman, I went. When come, I made trial and found the child come right, but without advantage, though pains were strong. I made use of what came next by thought, getting it a little better fitted at smith's shop hard by, with which I brought away the child, though with much difficulty."

The forceps of Avicenna, like those of Jacobus Rueff, were small and imperfect instruments, the blades being united by a fixed point, and therefore necessarily introduced into the vagina together and there opened to catch hold of the head of the child, *si possible sit!* This same malconstruction occurs in Chamberlen's first forceps, which was merely an enlarged copy, with fenestrated blades, of the "forcipes longa et tersa," described by Rueff in 1524.

In Chamberlen's second forceps we find that he had discovered the inconvenience of the fixed point, and I think

the only credit he deserves is that of opening and enlarging the blades, and doing away with this articulation. On their own showing, none of the Chamberlens, from Dr. Paul, the supposed inventor, down to Dr. Hugh, the translator of Mauriceau's work, are entitled to much gratitude from posterity for their boasted discovery of an instrument professedly designed to save life and relieve suffering, but which they sordidly kept a close secret for their own aggrandisement. Up to the time when the sixth and last edition of his translation of Mauriceau's first volume was published, in 1715, Dr. Hugh Chamberlen retained his secret.

"My father, brother, and myself (though none else in Europe as I know), have, by God's blessing and our own industry, attained to and long practised a way to deliver women in this case without any prejudice to them or their infant, though all others (being obliged, for want of such an expedient, to use the common way) do, and must, endanger, if not destroy, one or both with hooks."

Some years ago, the late Dr. M. Keever, who was long distinguished as an obstetric practitioner, presented me, amongst other papers, with a manuscript containing a version of the history of Chamberlen's failure with the forceps in his Paris case, as related in the earliest lectures (by Dr. Young) delivered in Edinburgh, on midwifery.

Dr. Young's account is evidently founded on Mauriceau's from which it only differs in saying that—"The woman died under his hands undelivered, upon which he quitted Paris without selling his secret. This afterwards turned out to be the forceps, which had saved the lives of thousands that otherwise must have been lost. The next writer is Giffard, who practised about the same time with Chapman, and it was he that introduced the frequent use of the forceps, and who perhaps had more practice with them than any of his predecessors, or even successors...........Chapman only delivered six, and these with one single blade of the forceps. This single blade, or vectis, is what is called Roonhuysen's secret, and in Holland none are allowed to practise midwifery with-

out being instructed how to use this single blade by the professor appointed for that purpose."*

The foregoing account of the introduction of the forceps into practice differs somewhat from that given in another manuscript, also recently in my possession, containing the unpublished lectures on midwifery delivered in Edinburgh in 1776 by Professor Hamilton. In the latter is erroneously stated that before attempting to use the forceps in his celebrated Paris case, Chamberlen had obtained a thousand pounds from the French Government for divulging his secret. "This Sum," says Dr. Hamilton, "was readily granted, and he was called to the next laborious case that occurred, but in this he was foiled, and Mauriceau afterwards delivered the woman by opening the child's head, but the woman died, as Mauriceau mentions, from the instrument of the English operator wounding the uterus in several places. Chamberlen left Paris and came home by Holland, and, it is said, there showed the forceps to Roonhuysen; this, however, is disputed, but most certainly it was not known at Paris for a long time after—not, I believe, till 1734. Most certainly it was not known at the time that Palfyn came to Paris to publish his system of surgery............After Chamberlen, Chapman improved them, but very little. Both his and Chamberlen's were straight, by which they could not be worked with, without the handles injuring the woman very much behind. Levret introduced a curved pair. Freke armed his with a crochet at one end and a blunt hook at the other, by which the practitioners went about armed at all points. Freke's instrument is too long; however it is used all over the Continent with a very slight alteration.

Smellie, who had a very considerable mechanical turn, improved the forceps most. He first constructed a wooden pair, but he found this so difficult of application that he soon gave it up and had a steel pair made. Dr. Wallace Johnston next improved the forceps; he added the curve of Levret; increased the breadth of the blades and diminished the weight

*Dr. Young's Manuscript Lectures.

of the instrument. The London practitioners are every day inventing new ones, but they are in no degree superior to this. After all that has been said about the forceps, I may now remark that a man who has been used to deliver with instruments may deliver with the shafts of a couple of spoons; yet young practitioners find considerable difficulty in delivering with the modern forceps."*

The case in which Chamberlen failed to effect delivery with his forceps in Paris, as narrated by Mauriceau, reflects more credit on the English than on the French accoucheur—the latter left the woman to die undelivered, the former at least attempted to assist her:—"On the 19th of August 1670," says Mauriceau, "I saw a small woman, aged thirty-eight, who had been in labor of her first child for eight days. The waters escaped on the first day without hardly any dilatation of the os. Remaining in this condition until the fourth day, I was sent for, and recommended the midwife to bleed her; and in case this did not produce effect I hoped, to administer an infusion of senna to excite pains, which she had not; this was done the following day, and succeeded in causing pains, by which the mouth of the womb was dilated as far as possible. Nevertheless, I could not deliver, and the child had remained in the same situation, without been able to advance, for this woman was so small, and the bones (of the pelvis) so narrow and close to each other, and the sacrum so curved forwards, that it was quite impossible to introduce the hand to deliver her, although mine is small enough......... or to introduce the fingers sufficient to enable me to use a crochet safely, so as to extract the child, which had been apparently dead for about four days. I declared the impossibility of delivering this woman to my assistants, who being well persuaded of this, prayed me to perform the Cæsarean operation, which I would not undertake, knowing well that it was always certainly fatal to the mother. But after I had left the woman in this condition, it not being possible for me to help her as I would any other of a more normal conforma-

*Dr. Hamilton's Manuscript Lectures, Vol. I, p. 228.

tion of body, there came shortly afterwards an English physician named Chamberlen, who was then in Paris, and who, from father to son, made a profession of midwifery in England, in the town of London, where he thus acquired the highest reputation in that art.

This physician finding the woman in the condition just stated, and learning that I had not found any possibility of delivering her, declared himself astonished that I could not do so. "Moy (says Mauriceau, with all a Frenchman's untranslatable vanity), qu'il disoit assuroit estre le plus habile homme de ma profession qui fort a Paris"; notwithstanding which he at once promised to deliver her most assuredly in less than a quarter of an hour, whatever difficulty he might find. Accordingly, he immediately applied himself to the business, and in place of half a quarter of an hour he worked more than three entire hours without cessation, except to take breath. But having vainly exerted all his strength as well as all his industry, and seeing that the poor woman was almost dead in his hands, he was obliged to abandon the attempt and to allow that he could not accomplish it as I had well-declared. This poor woman died undelivered twentyfour hours after the violence he had done her, and at the examination I made in performing after her death the cæsarean operation, which I would not do before, as I had said, I found the child and everything else as I had before stated, and the womb all torn and pierced through in several places by the instruments which this physician had blindly used without the control of his hand, which being a size larger than mine, he did not seem to have been able to introduce sufficiently far so as to preserve it". Mauriceau then goes on with great complacency to observe that the English physician, who had come six months previously to Paris, in the hope of making his fortune, had circulated a report that he had a secret (tout particulier) for such cases, and vaunted that he could thus deliver in even the most desperate and otherwise hopeless cases in less than half a quarter of an hour, and had even proposed to the first physician to the King that for a reward of ten thousand crowns he would disclose his pretended secret. "Mais la seule

experience de ce facheux accouchement le degouta tellement de ce pais-li, qu'il s'en retourna peu de jours en suite an angleterre; voyant bein qu'ily a Paris de plus habile gens en l'art des accouchemens que lui." Before leaving Paris Chamberlen called on Mauriceau, and after various compliments had passed between them, the latter thus concludes his account of the visit:—"Je recus son compliment comme je devois lui faisaut entendre qu'il s'etait bien trompe en croyant trouver autant de facilite a accoucher les femmes a Paris, comme, il avoir pie trouver a Londres ou il retourn a le lendemain emportant avec lui un examplaire de mon livre; qu'il fit imprimer apres l'avoir traduit en Anglais en l'anne, 1672, depuis laquelle traduction il s'est acquis un si bout degre de reputation daus l'art des accouchemens daus la ville de Londres, qu'ily a gagne plus de trente mille livres de rente, qu'il possede presentment."*

*Observations sur la Grossesse et l'Accouchemens des Femmes, Par Francois Mauriceau, Ancien Prevost de la Compagnie des Maitres Chirurgien de la ville de Paris. Observation xxvi, p. 25. Paris, 1715.

SECTION III.

HISTORY OF FORCEPS IN HOLLAND.

(1693 A. D.—1753 A. D.)

This history is very obscure and gave rise to many comments. It is certain, however, that Hugh Chamberlen was at Amsterdam in 1693, where he acquired a friendship with Roger Roonhuysen and communicated his secret to the latter. It is certain also that Roger Roonhuysen, once aware of the method employed by Chamberlen to facilitate difficult labours—whatever that might have been—kept the secret carefully concealed. It is stated that Chamberlen sold his secret to Roonhuysen at a large price. The latter succeeded in carrying on a monopoloy of the forceps in Amsterdam for sixty years (1693-1753).

During this period Roonhuysen made use of this professional secret for monetary gain and had with him several associates forming themselves into regular commercial concerns. From 1693-1709, he had with him Fred. Ruysch and Corn Boelkman; from 21-3-1709 to 1720, with Andre Boelkman, Jean De Bruin and Pierre Plattman; from 1721-1735, with Albert Titsing, Regnier Boom, Pierre Plattman Jun. Bartheleme de Moor, a physician of Gand and Trochin, inspector of the Medical College at Gand ; and from 1735 to 1753, by Jacques Van Dieden, Surgeon of Utrecht, Abraham Porjeere of Amsterdam, Paul de Vind, Physician of Magdebourg and Gerard de Wind, practitioner of Amsterdam.

By the influence of the members of these associations, a Municipal law was passed on 21 January, 1747, obliging every practising obstetrician in Amsterdam to purchase the secret and Roonhuysen with his associates, formed themselves into an autocratic medical association—the Medico Pharmaceutical College of Amsterdam—which ruled obstetric practice without compunction. This Association was given the sole privilege

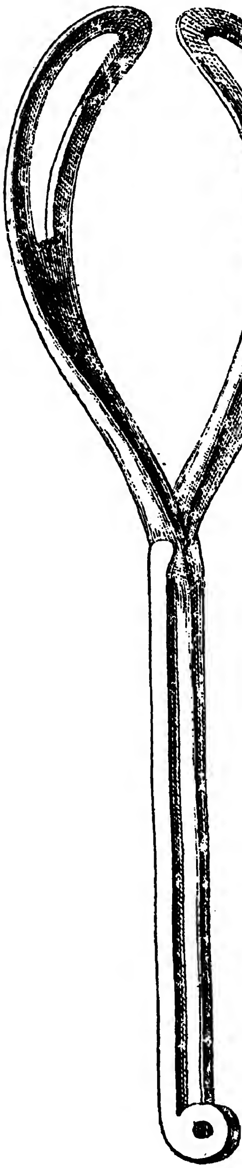


FIG. 91.—Rathlaw's Tire-tete (Kilian Armamentarium)

of licensing physicians to practise in Holland, to each of whom under pledge of secrecy, was sold Chamberlen's invention for a large sum. The secret was kept till 1753 when Jacob de Vischer and Hugo de Poll bought it from the wife of Jean de Bruyn, under the name of Roonhuysen's lever and described it and made it public. Whether this was all that Chamberlen sold to Roonhuysen or whether the Medico-Pharmaceutical College had swindled the purchasers of the secret, is not known.

It has been stated that the Amsterdam monopoly came to grief in 1732 through Rathlaw, an obstetrician of Amsterdam, who refused to purchase the secret of Roonhuysen and thus failed to obtain the diploma to practise. He believed that it was not possible to invent an instrument, the use of which was so certain, so general and so necessary, that none could be an accoucheur without a knowledge of this. He communicated his grievance against the monopoly to a friend, Velsen, a physician at the Hague, who, by questioning a former student of Roonhuysen, discovered the secret. The student, Van der Swam, had lived with Roonhuysen in 1697; his curiosity regarding his master's secret had impelled him to make frequent efforts to examine the forceps, but without success. While attending a case Roonhuysen was summoned by the burgomaster, and putting his instruments in a bag, he hastily concealed them. He had been observed by Van der Swam, who opened the bag in his absence and took the design of the forceps. And Rathlaw gave to the world the forceps of Roonhuysen and the forceps that he himself had made in Paris in 1732. Rathlaw's "tiretete" was a modified Chamberlen—Roonhuysen forceps. The details are found in a brochure, entitled "The famous secret of midwifery by Roger Roonhuysen, discovered and published by Royal authority,"* which Rathlaw published in the same year he was refused permission to practise.

One can easily imagine the vexation and anger of the accoucheurs of Amsterdam, who considered themselves to be the sole guardians of the secret of Roonhuysen. They main-

*Het berugt geheim in de Vroedkunde von Rogier Roonhuysen Outdekt en uitgegeven of hooge order. Door Jean Pieter Rathlawe. Amsterdam 1747 in—8O.

tained that the instrument described by Rathlaw was not Roonhuysen's instrument at all. They replied to their opponent by a publication* entitled "clear demonstration that the secret of Roger Roonhuysen as discovered and published by J. P. Rathlaw is absolutely false and the instrument which he has figured is ordinarily quite useless and injurious in difficult labours, both for the mother and the child".

Rathlaw's reply† proved beyond doubt 'that the instrument described and discovered by Van der Swam and published by him under authority was the real secret of Roonhuysen.

It may be mentioned here that Jean de Bruin, a pupil and later on an associate of Roonhuysen, confided on his death bed to his daughter Gertrude de Bruin, and her husband Thomas de Heide (an accoucheur), the secret of his old master, on 23rd Jan. 1753. The couple sold the secret to Jacque de Visscher and Hugues Van de Poll, physicians of Amsterdam, who on opening the box containing the secret instruments, found amongst others, four rather similar ones which Jean de Bruin employed for extracting the head of the fœtus. Of these a sketch was made of one, at first and published; in the following year, two others were similarly sketched and published. The first one was described as the original instrument of Roonhuysen, the second one as that of Regnier Boom and the third one, Titsing, the last two were associates of Roonhuysen. Now, these three instruments supposed to belong to Roonhuysen, are not at all the forceps described by Rathlaw as the original instrument of Roonhuysen. It was not a forceps (tongs) at all but merely a steel lever about 15½ c.m. long 2 c.m. broad, straight in the middle but very slightly curved towards the ends, covered with leather. It was a kind of non-fenestrated spatula.

*Klaare bewyzen dat het geheim in de Vroedkunde Van Roger Roonhuysen Outdekt en nitegegeren door J. P. Rathlaw Votstrekt Vals en het instrument daur in afgeheelt, in ordinaire gevallen absolut onnat, en in de moegelyksfte Baringen ten nitarsten gevarcyk Voor de moeder en doodlyk voors kind. Amsterdam 1747 in 8o.

†Replicq dat is outwyfelbaare egtheid en veilig biel van het geheim van R. Roonhuysen, op hooge order door J. P. Rathlaw, tegen bet lasters chrift van de vyf Heeren Vroedmeesters geintituleert, Klaare bewyzen Amsterdam 1747 in 8o

FIG. 92.

FIG. 93.

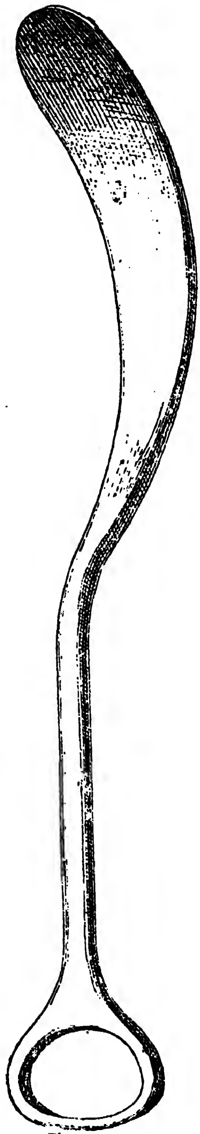


FIG. 94.

FIG. 92.—Roonhuysen's lever (Kilian).
FIG. 93.—Boom's lever (Mulder).
FIG. 94.—Titsing's lever (Kilian).

Apparently the wordy war between Roonhuysen and Rathlaw ended in a triumph of the latter in 1747 and the permanent defeat of the Amsterdam monopoly.

It appears that Rathlaw returned to France about the year 1785. During his stay at Paris, he proposed to Bretueil the then minister (through Dudere Le Borde, the sub-lieutenant of the Grenadier Guards of France), that he would make public his own invention of forceps for a consideration of three hundred thousand Livres. The offer was not accepted and Rathlaw died sometime later, divulging his secret to Dudere La Borde, who tried to utilise the secret to his own pecuniary advantage. He made a petition* to the Legislative Assembly on 20th December, 1791, offering to disclose the instrument of Rathlaw provided he was given a reward. He stated that the instrument or *parturateur* was not made of steel and did not resemble a piece of steel like the lever of Jean de Bruin, and that it could be used in all cases where forceps was used to extract the head. To ignorant people this *parturateur* could very well be passed as being not made of steel because the steel which formed the main part of it, was carefully covered by leather.

It may be added that in the same year that Rathlaw was trying to dispose of, for a consideration, what he called as the forceps of Roonhuysen, his fellow-countryman Jean Daniel Schlichting† published a diagram of an instrument rather similar to that of Rathlaw and which he saw at the house of Guillaume Utevens, who, in turn, got it from Brederade, a pupil of Fredrick Ruysch. Heister gave a figure of this forceps in the second Latin edition of his book (1747 in 4° pl. XL), stating that Schlichting was the first to discover this instrument of which such a secret was made so far. Heister was evidently not aware of the publication of Pierre Rathlaw, which, however, appeared in the same year.

*Petition du citoyen L. P. Dudere L. Borde, ancien sous-lieutenant au corps des grenadiers de France, a la convention nationale, sur la necesiate de substituer a L'usage du fer, dans le plus grand mombre des accouchements difficiles, une methode particuliere d'acconcher, qui nest nullement meurtriere. Paris 1792 in 8° de 8 pages.

†Embrynleia detecta, 1747, in 8°. Amsterdam.

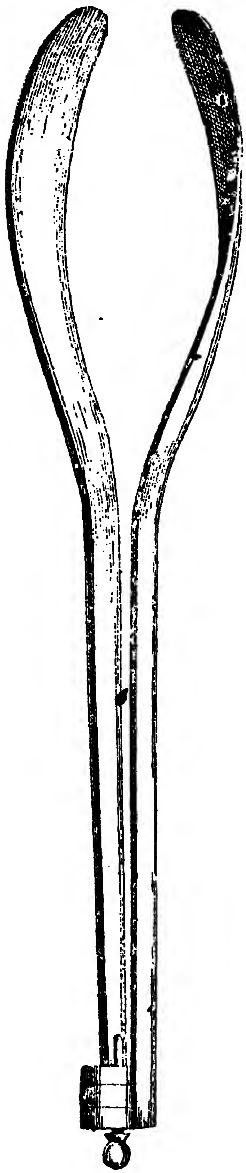


FIG. 95.—Schlichting's Tire-tete (Kilian).

Such briefly is the history of forceps in Holland, which although reads like romance, is nevertheless strictly accurate.

The question then arises, whether the iron-bar produced in 1753 as Roonhuysen's lever, is the identical instrument which Roonhuysen obtained from Chamberlen in 1693 and whether it was the same instrument which Bruin received from Roonhuysen and which Bruin, on his death bed gave over to his daughter Gertrude who sold the secret to Visscher and Van de Poll.

It has been said that Chamberlen in order to keep his secret effectively, gave a different instrument to each of the German doctors Roonhuysen, Ruysch, and Bokelman, who constituted the first association. But this supposition can be hardly believed because Schlichting published a description of an instrument which he had received from a pupil of Ruysch and which was almost exactly like the forceps which Rathlaw received from a pupil of Roonhuysen. It was evident, therefore, that Ruysch and Roonhuysen must have possessed the same instrument—a real forceps. According to Haller, on the other hand, Titsing (whose name is associated with a spatula or lever) assures that Roonhuysen made use of two shoe-horn like spoons, which were applied to the two sides of the head. It is clear, therefore, that whenever an instrument was described as the one actually in possession of Roonhuysen this was a kind of forceps and it is probable that the shoe-horn like spoons mentioned by Titsing was an attempt made by Roonhuysen to improve an instrument which Chamberlen had confided in or sold to him.

To recapitulate:—(1) The obstetrical instruments found in 1818 in the old manor-house of the Chamberlens are those which the accoucheurs invented and used.

(2) These were the same instruments which Hugh Chamberlen tried to sell in Paris in 1672 and afterwards took over to Roonhuysen in Amsterdam in 1693.

(3) The lever, said to be the invention of Roonhuysen, seems really to be the invention of his pupil Jacque de Bruin.

SECTION IV.

EIGHTEENTH CENTURY.

1720. Palfyn.

Jean Palfyn was a distinguished surgeon accoucheur. He was born at Courtrai on 28th November, 1650, and died at Gand on 21st April, 1730. Doran says, "He (Palfyn) came to Paris in 1720 to superintend a French edition of his work on Surgical Anatomy and exhibited his forceps at a meeting of the Academic Royale des Sciences. In 1723, the instrument received the approbation of the Faculty in Paris." Doran further comments, "I can not discover on what authority Charpentier gives the date as 1713, seven years earlier than in Mulder's note. It may be a misprint, very probably Palfyn used his forceps long before 1720 but dates appended to reports of meetings of learned societies of the old French Academy are not likely to be inaccurate and their archives are usually to be found handy for verification in medical and scientific libraries." Chereau gives the date of Palfyn's going to Paris as 1716.

About this time La Motte* absolutely condemned all kinds of obstetrical tractors but fortunately his condemnation has not been supported by any future author or investigator.

Levret† also mentions about Palfyn's coming over to Paris when "we had an opportunity to examine Palfyn's instrument." He very aptly remarks that, in all probability, Palfyn conceived the idea of his invention from the figure of the blunt hook or spoon with broad handles, of Amb. Pare. It seems that when it was found that a single spoon was not sufficient or efficient to extract an impacted head, the accoucheur of Gand had the intelligence to see that it was necessary to use two spoons, so that when used simultaneously, they helped each other. Levret

*Traite complet des accouchements 1721 in 4° p. 885.

†Observat. sur la cause et les accidens de plusieurs accouch. laborieux; Paris 1747. in 8° p. 81.

then adds that a Surgeon of Yapres named Gille Ledoux used to fix the handles of the two spoons of Palfyn with a ribbon after introducing them separately on the two sides of the fœtal head. It also appears that a small transverse hook was invented to join together the spoons, in a sort of hinge by applying it on the stems. This transverse hook could slide up and down the stem, so that the pressure on the head could be adjusted.

It is certain that in attributing to Ledoux the ribbon, to tie handles of Palfyn's spoons and to some one who invented the transverse hook for keeping the two branches together, Levret could not have heard about Heister for otherwise he would surely have given that great surgeon, the credit due to him.

In fact it was Laurent Heister, Professor at Altdrof and at Helmstadt, who had this brilliant idea, as will be seen from the following extract.* "The uselessness of all the means now employed to help delivery, no doubt led Palfyn to devise an instrument with two branches, of which each terminated in a kind of smooth and wide spoon. These branches could be applied to the two sides of the fœtal head, to extract the child without causing laceration or much damage. Palfyn used this instrument when the child is still living or at least when one is not certain of its death.

This was communicated to me by a friend from whom I got the instrument. As far as is known he has not published anything on the subject. I have also used the forceps under similar conditions but without success. If the head is seized only lightly with this instrument it can not be pulled out; on the other hand if extra pressure is employed to seize the head firmly, it is liable to be injured. In view of this experience, I tried to improve the instrument by uniting the two branches by a metal ring or hook, so that the head of the child could be

*L. Heister, Institut. de chirurgie; trad. de Paul, Avignon, 1770 in 4° t.II p. 430 & 449.

It should be mentioned here that the first German edition of the work was published in 1718 and the first Latin edition in 1739. Chereau declares that this passage does occur in the Latin edition and thinks that the German edition very probably also contains it, although he had no opportunity to refer to it. The latter reference should be verified, as in an historic question of such importance, a period of 21 years can not be neglected.

held more efficiently; but inspite of this modification the instrument did not work efficiently. In difficult labours, one is led either to perform Caesarean Section or to use the sharp hooks. However as I have just said, I have for a long time advised to unite the two branches by means of a mobile axis or by tying them together by a tape so that they might have a firm grip on the head and are less likely to slip. I find that my idea has been followed by many accoucheurs, who by joining two blunt hooks with the help of movable axis, gave it the shape of a pair of tongs or forceps with which they succeeded to extract, not only dead children, but also living ones, as is verified by Chapman Giffard, Boehmer and the Edinburgh essays."

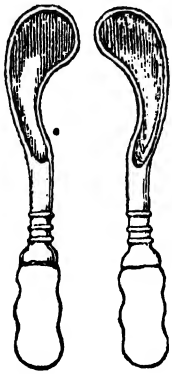


FIG. 96.

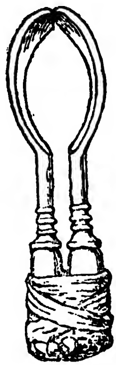


FIG. 97.

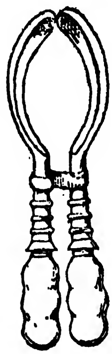


FIG. 98.

FIG. 96.—Palfyn's two spoons as they were used by him simultaneously. (Chereau).

FIG. 97.—First method of joining Palfyn's spoons by strap or a napkin by Heister. (Chereau).

FIG. 98.—Second method of joining Palfyn's spoons by a mobile hook or ring by Heister. (Chereau).

The following conclusions may be drawn from above. (1) That Heister was not aware of Chamberlen's forceps in 1739, as he makes no mention about it although he talks about the forceps of Chapman and of Boehmer both of whom practised at a much later date than Chamberlen. (2) That he gives Palfyn the credit of employing the two spoons simultaneously. (3) That it was Heister who had the original idea of tying

securely the two spoons or of connecting them together by a movable collar.

Moreover Heister enriched his work by a diagram of Palfyn's spoons (plate xxxiii fig. 16), which was stated to be

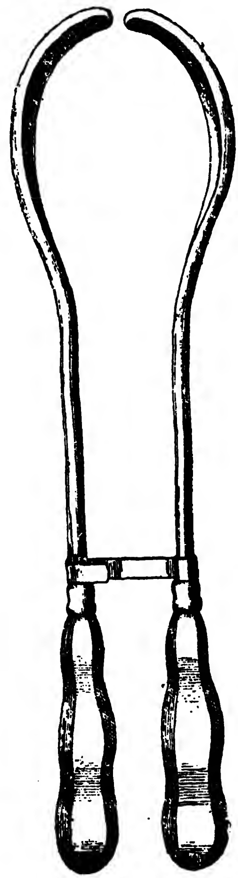


FIG. 99.
Palfyn's Forceps.
(Kilian).

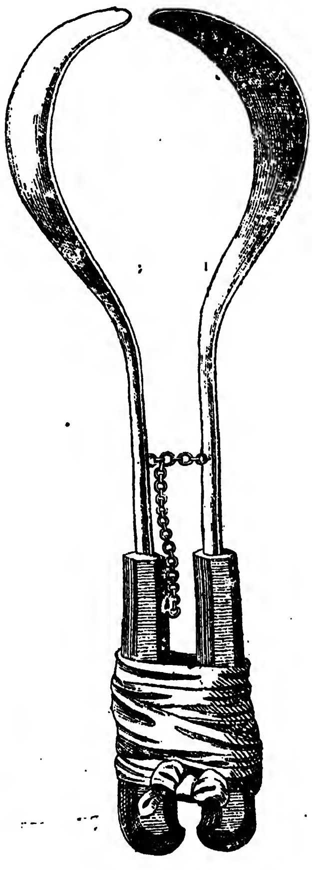


FIG. 100.
Palfyn's Forceps.
(Kilian).

half the original instruments. This would indicate that the actual size of the instruments was 28.4 cm. long. The figures reproduced here, show (1) two of Palfyn's spoons near each

other, as they were employed by him, (2) the same spoons tied together by a napkin and (3) the spoons coupled by a mobile hook, which was said to have been invented by Heister. The

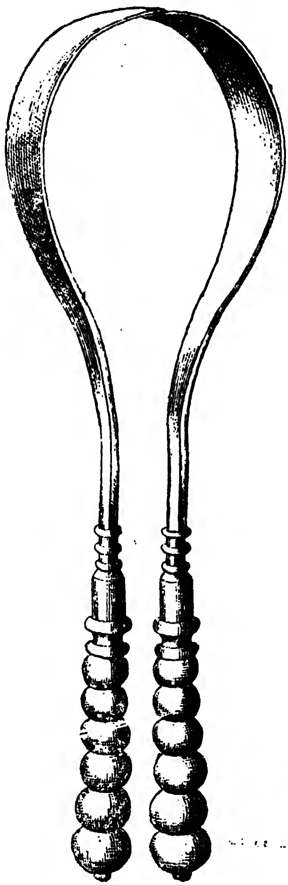


FIG. 101.
Palfyn's Forceps
(Kilian).

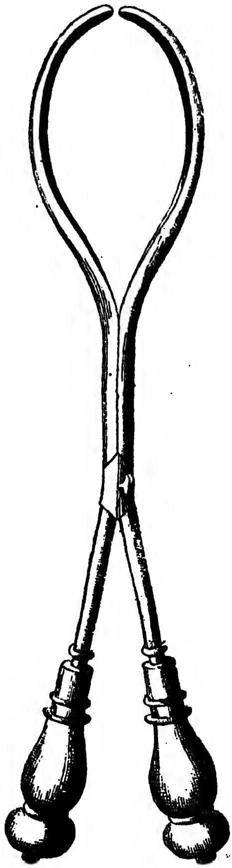


FIG. 102.
Palfyn's Forceps
(Kilian).

method of joining the two spoons, however, did not prove very successful. (See figs. 97, 98, 99).

In 1770 Antoine Petit taught his pupils that, "There are three kinds of forceps, Palfyn's, Smellie's and Levret's. The

first was devised by Douglas* about sixty-eight years ago. It was for a very long time unknown in France; it is only some thirty-six or forty years since Palfyn, surgeon of Ghent, brought it to Paris and passed himself off as the inventor. At the same time, a certain Gilles Ledoux, surgeon at Ypres invented something very similar and reported his pretended discovery to Palfyn, in consequence of which the invention of that instrument is much disputed. It bears different nâmes; in France it is called Palfyn's forceps: in England, Douglas's forceps: and in Flanders, Gilles Ledoux's forceps. Petit makes no mention of Dusee. Mulder, however quoted from an earlier work of Petit's where a forceps much of the same type as Dusee's was described.

1721. Ciaccius.

Sebastian Melli, Professor of Surgery, at Venice, describes in his book--La commare levatrice istrutta nel suc offizio. Venice, 1721—a toothed forceps invented by Philipp Ciaccius. Its utility is limited only for dead fœtus. No diagram of the instrument is available.

1723. Gilles Doux.

(See Palfyn).

1730 (?). Maubray.

Schlegel, in his translation of Mulder's Historia, gives an appendix in which he refers to Maubray, who "gave a diagram of Chamberlen's forceps," and is supposed to have "made some improvements on the forceps." Maubray however gave no description of his forceps. No diagram of his supposed modified instrument is available.

John Maubray was the author of two books on Midwifery: —(1) The Female Physician and (2) Midwifery brought to Perfection by Manual Operation. He is worthy of remembrance

*Doran failed to find Petit's authority for this statement. The dates show that the Douglas mentioned could hardly have been John, surgeon to the Westminister Hospital.

as the first teacher of practical midwifery and the first to suggest the building of a lying-in hospital. He died on October 27, 1732.

1733. Dusee.

The attempts made by Heister to join together the two Palfyn's spoons, have already been alluded to. The methods employed were far from satisfactory because, although it prevented lateral displacement, it did not prevent longitudinal displacement. The clever accoucheur Dusee was able to carry out the most remarkable and essential modification, viz. the articulation of the branches. He flattened a portion at the middle of each branch at the lower end of the curve of the spoon and joined them by passing a long screw through them.

Moreover, he got the straight handles of Palfyn's spoon, bent outwards like hooks, in order that the instrument could be held more securely. He also increased the curvature of the branches, so that the temples of the fœtus might not be unduly compressed. Alexander Butter realized the importance of the new forceps of Dusee and described it with illustration.* *In fact this was the first real attempt to articulate the two branches,* which engaged the attention of so many practitioners. Dusee's forceps was exhibited in 1733, not by the inventor in France but by a Scotchman in Edinburgh. Dusee's name is thus closely associated with the public diffusion of knowledge and use of the short forceps which occurred between 1720 and 1740. The Chamberlens kept their secrets fairly well. Hugh Chamberlen, junior, died in 1728, and another obstetrician, Drinkwater, who had also used the forceps secretly, died in the same year. Palfyn had made public his forceps or *mains de fer* eight years previously.

The following description of Dusee's forceps in the museum of the College of Surgeons in England, (see figs. 103 and 104) is given by Alban Doran.† "The instrument weighs 1 lb. 6½ oz. or 640 grammes and measures 16 inches or 40.5 cm.

*Medical Essays and observations of Edinburgh (vol. III, 1733 Art 20 and pl. v. fig. 4) (1735, iii, 320-322, 1 pl.).

†Journal of Obs. and Gyn. of the British Empire vol. xxii, 1912, p. 121.

in length. Each blade is a solid piece of elastic steel. In the illustration to Butter's report, the length is reduced to 5¼ in. or about one-third. The blades measure 7 inches or 17.7 cm. to the upper lock and 9¼ inches or 23.5 cm. to the lower lock. There is reason to believe that it is the identical instrument

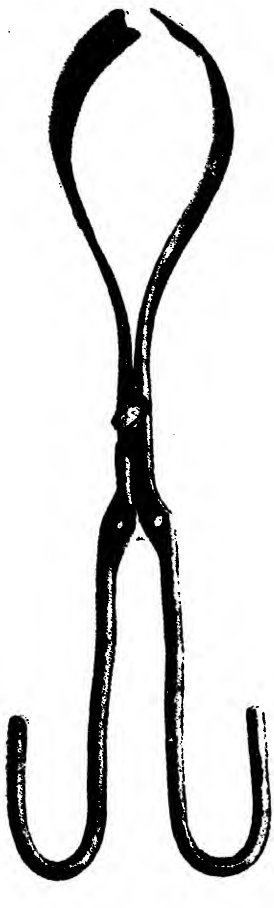


FIG. 103.

Dusee's Forceps.
In the Museum of the Royal College of Surgeons, England with the screw in the upper lock.
(Doran).

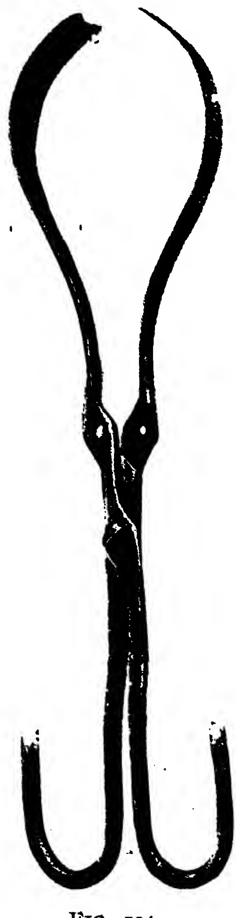


FIG. 104.

Dusee's Forceps.
Same as in fig. 103 with the screw in the lower lock.
(Doran).

figured by Butter's artist. It is true that its handles turn up a little more, but the artist might have been inaccurate in this respect. The blades appear identical, both are concave at the termination, the screw is the same although its head is drawn a little out of perspective and the drawing represents the metal around the lower screw hole as coarsely cut and bevelled, precisely as is seen in the forceps in the museum. Ingerslev's illustration (Fig. 105) is not the same being shorter and different about the lower screw holes—but the artist here again might have been inaccurate. The drawing was probably taken from Kilian's *Atlas*, presently to be noted.

I have tested both locks and they appear to work satisfactorily. In one photograph (fig. 103) as in Butter's drawing the screw pivot is seen applied to the upper lock. The drawings of Dusee's forceps in atlases and monographs of obstetrical instruments make the screw holes of the lower lock too small. In the forceps preserved in the museum of the College of Surgeons the holes are ¼ inch or 6.3 millimeters in diameter and the screw fits into them perfectly. As I can not find a drawing of this forceps with the screw fitted into the lower lock elsewhere, I have added a second photograph (fig. 104)"

There is no sample of Dusee's forceps either in the Hunterian Museum, Glasgow University or in the museum of the University of Edinburgh. But Dr. R. W. Johnstone informed Doran that an obstetrical collection, in a special department of the University of Edinburgh possesses two Dusee's forceps. One of them is smaller and narrower than the College of Surgeons specimen and bears a different screw. Dr. Johnstone assured Doran that, it is the same which is figured in Sir Alexander Simpson's address.* The second forceps in general configuration, corresponds exactly to the College specimen. But it bears the name of a maker "Still" clearly not a Frenchman. The college specimen bears no name. Again each blade is distinctly *convex* at its extremity. In the college specimen a distinct *concavity* is a prominent feature. It tallies with the drawing illustrating Butter's report (fig. 106). "A, is the extremities of the blades made more concave in the middle than

*Obstetrical Transactions Edinburgh, Vol. viii, 1883

is necessary to fit them to the surface of the convex head of the child, in order, as Mr. Dusee said, to hinder them to compress the temporal arteries." Thus Butter lays stress on an

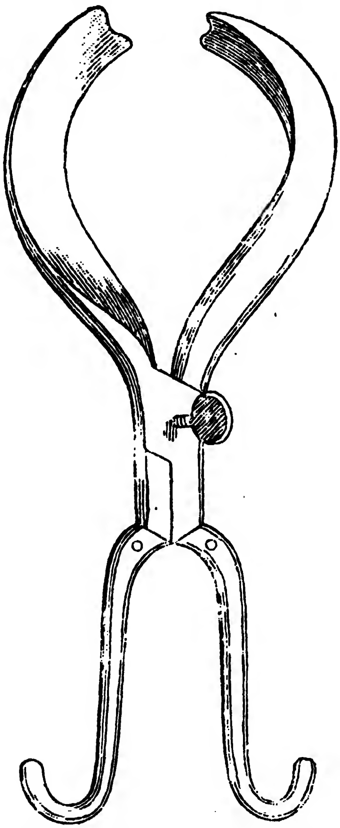


FIG. 105.—Dusee's Forceps after Ingerslev. (Doran).

essential feature of this forceps as originally designed by Dusee. Lastly the Edinburgh forceps is more highly finished and the distance between the upper and lower locks is distinctly greater than in the College specimen which once more accords with Butter's drawing. Hence we may reasonably conclude that this Edinburgh forceps represents an improved instrument constructed by a British maker, after the directions of Butter who records his objections to the concavity at the end of each

blade or of Smellie himself, who it seems employed Dusee's forceps before he designed his own with the pelvic curve.

Butter's report on Dusee's forceps,* which was read in 1733, is reproduced in full.

The Description of a Forceps *for extracting Children by the Head when lodged low in the* Pelvis *of the Mother; by* Mr. Alexander Butter, *Surgeon in Edinburgh*:

The Forceps for taking hold of a Child's Head, when it is fallen so far down among the Bones of the *Pelvis*, that it can not be pushed back again into the *Uterus*, to be extracted by the Feet and when it seems to make no Advances to the Birth by the Throws of the Mother, scarce known in this country, though Mr. *Chapman* tells us, it was long made use of by Dr. *Chamberlane* who kept the form of it a secret, as Mr. *Chapman* also does. I believed therefore that a sight of such an Instrument which I had from Mr. *Dusee,* who practises Midwifery at *Paris*, and who believes it to be his own Invention, would not be unacceptable to you, and the Publication of a Picture of it may be of use to some of your Readers.

Tab. V., *Fig.* 4. represents this instrument seen obliquely, of one third of its real Dimensions.

A. Is the extremities of the blades made more concave in the Middle than is necessary to fit them to the surface of the convex Head of the Child, in order, as Mr. *Dusee* said, to hinder them to compress the temporal Arteries.

B. Is the convex side of the one blade.

C. The concave surface of the other.

D. The Hinge where the two blades cross.

E. A large flat Button of a Screw, which serves as an *Axis* to the Hinge and can be taken out at pleasure.

F. A second Hinge by which the Blades can be joined when the child is higher up than can be conveniently reached by the Instrument, when the other Hinge is employed.

*Medical Essays and observations, Revised and Published by A Society in Edinburgh, vol. III. The Second Edition corrected, Edinburgh: Printed by T. and W. Ruddimans, etc., MDCCXXXVII.

G. G. The Handles.

When this instrument is to be used, the *Axis*, of the Hinge is to be taken out and each Blade, being directed by one Hand in the *Vagina*, is to be introduced separately along the side

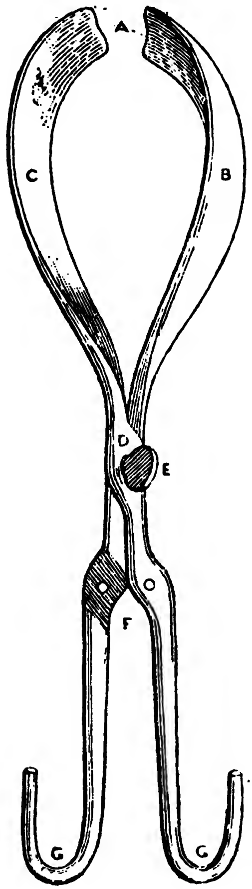


FIG. 106.—Dusee's Forceps.
From a drawing published with Butter's report in 1733. (Doran).

of the *Vagina* and betwixt it and the side of the Child's Head as far as immediately above the Ears then the two Blades of the Instrument being crossed, the *Axis* is put into the Hinge,

which the Operator finds most convenient to employ, after which the child's head is to be taken firm hold of, and the Operator pulling by the Handles, extracts the child.

I think Mr. *Chapman* is in the right to desire the *Axis* not to be put in, for it is very troublesome to take out and put in again, when any of the Blades quit their Hold, and the Instrument can easily be managed without it, in extracting the child in the Manner mentioned ; and in several cases where it may be requisite to dilate the lowest part of the passage at the same time that the extraction is making, the Blades of the *Forceps* require to be separated, and are not to be crossed or moved upon a Hinge.

You'll easily see, that often when the Head of a Child is a little too far forward on the *Ossa Pubis*, or turned too far backwards, that one Blade only of this *Forceps* can be employed to bring it to a right situation and to assist the Birth.

Such is Butter's report.

Prof. Paul Bar informed Doran that neither the French museums, nor M. Collin the instrument maker in Paris possessed any models of Dusee's forceps.

Prof. Kouwer of Utrecht informed Doran: "I have found a forceps in Mulder's collection, which is in my clinic, that *almost* answers to the description and picture of Dusee's forceps according to Mulder's book, but not quite."

Doran declares that the forceps displayed in the Obstetrical Society's Museum and labelled as "Antique Forceps. No. 2," is an authentic sample of Dusee's forceps.

Of Dusee himself, little is recorded in the article devoted to him in the Biographical Lexicon.* It is stated that the name of this Parisian Obstetrician of the 18th Century is recorded in the history of forceps because he was the first to modify Palfyn's instrument so as to make it really of service for its purpose. The lexicographer states that Dusee's addition of a screw to the blades in 1734 "naturally put an end to the trade-secret of Chamberlen's forceps." Then the article adds: "it is most astonishing that the description and portrayal and consequently

*Biographisches Lexicon der Hervorragenden Aerzte aller Zeiten und Volker by Gurlt and Hirsch, 1885.

the popularization of the forceps is to be traced not to France but to England." Butter is quoted in explanation. Dusee the article adds, never wrote anything about his forceps. It is known that he laid before the French Academy a work advocating circular friction of the gravid and parturient uterus through the abdominal walls as the best method of checking hæmorrhage and that he died in 1734. When we note the date of Butter's report it would seem that Dusee may have died before he had time to write about his forceps. Then publication was expensive in those days.

Dusee may, too, have had reasons for fearing to publish an innovation through the medium of the very few societies and journals then in existence.

Mulder of Leyden mentions Palfyn's and Dusee's forceps with interesting details. Palfyn, Ledoux and Heister's instruments are considered and then Mulder speaks of *Nescio quis* who introduced a jointed forceps, French pattern (pl. I, fig. 7) adding that this remarkably modest gentleman was approved of by Petit. Thus Petit described an instrument something like Dusee's but not the same. Mulder adds that Dusee's was devised with blades constructed so as to avoid damage to the foetal head high in the pelvis. Then he states that Dusee pointed out these advantages to Alexander Butter, an Edinburgh surgeon who forthwith gave a description of the forceps with a drawing at a meeting in the year 1733. Mulder figures the forceps (pl. I, fig. 8), a larger drawing than that accompanying Butter's communication but unshaded, being half the natural size of the instrument and adds in a foot-note that he had been obliged to rely on Butter for the account of the instrument which he had never seen. Butter, however, did not publish a drawing of the forceps as seen sideways. For its characters laterally Mulder had to consult a description given by Paulus de Wind. Mulder includes Dusee's and the unknown obstetrician's forceps in his very carefully prepared tables of measurement accompanying the plates. The Dusee forceps has very broad blades with exaggerated cephalic curves and the double lock arrangement is its most peculiar feature. The *forceps*

incogniti, has narrow blades, much less curved. In both instruments the blades are not fenestrated.

Thus Mulder confirms the generally accepted opinion that Dusee left the public demonstration of his forceps to a Scotch doctor. At any rate, no description by Dusee himself, of his own invention, is available. Doran could not find the description of Dusee's forceps given by his pupil Paulus de Wind, but it must have been made public after Butter's report.

Kilian* brought out two pictorial work on obstetrics, both very complete and elaborate. For some unexplained reason, Kilian figures Dusee's forceps in his *Atlas* (pl. XXXIV) but omits it in his *Armamentarium*: whilst on the other hand, Chamberlen's instrument is not represented in the *Atlas*, yet five goods drawings of it, showing its varieties, are included in the *Armamentarium* (pl. XIII. fig. 1 to 5).

Busch's Atlas (Berlin 1838), p. 308 contains a drawing of Dusee's forceps which seems to have been taken from another sample. Doran obtained a tracing of this from Prof. Bar and M. Collin. The handles turn up at their ends precisely as in the college forceps. The lock seems slightly different. But Busch's artist may have been more accurate than Butter's, for certainly Busch's drawing is the more finished of the two.

Von Siebold† considers "Dusee-Alexander Butter" forceps as an improvement of Palfyn's. The blades were longer so that the lock lay further from the external parts. Dusee's forceps are crossed and the blades are hollowed out at the end, so as not to squeeze the head of the child. Von Siebold does not omit to state that the blades are drilled for the screw pivot at two places and that the handles are turned up at the end. He considers that this forceps, unlike Palfyn's approached the English type, "and it is most remarkable that Dusee's instrument was also described and figured in England, as Alexander Butter in Edinburgh, published the first communication about it, in the city where he dwelt, in *Medical Essays*." Siebold conjectures that Butter in exhibiting the forceps "meant to

*Geburtshulflicher Atlas. Dusseldorf. 1835. Armamentarium Lucinæ Novum. Bonn. 1856.

†Versuch einer Geschichte der Geburtshulfe, Berlin, 1839.

stir up his countrymen, not wishing that they should keep their instruments secret. At any rate Chapman's public announcement of the English midwifery forceps followed soon after Butter's exhibition of Dusee's forceps in Edinburgh." Siebold adds that Dusee had at least one pupil, de Wind who remembered his forceps and recorded the fact that his teacher died at the end of 1734. It is clear that De Wind recorded nothing about Dusee's antecedents.

Churchill* gives a drawing of Dusee's forceps, which is copied from Butter or Mulder.

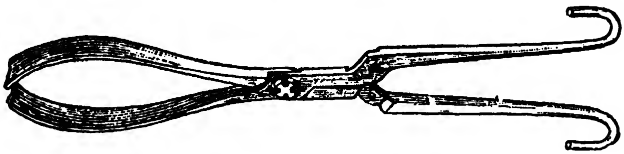


FIG. 107.—Dusee's Forceps.
Edinburgh sample (Simpson).

Sir Alexander R. Simpson† asks himself the question Who first introduced forceps into Scotland? and goes on to say: "I ask it without being able to answer it. Very likely Hugh Chamberlen had a pair of forceps in his valise, that time he came to Scotland to push his land bank scheme ; but if he tried to make money of his secret here, as he did elsewhere, he found the Scots too canny to traffic with him." He defines Dusee's forceps thus; "It is clearly a French instrument peculiar in that the blades are not fenestrated and that there are two points at which the instrument could be locked, one close to the handles, the other far up the shanks towards the blades."

He gives a drawing (see Fig. 107) and says: "Happily this engraving of the instrument makes it easy for us to recognise that it is the same kind of instrument as I now show you from the collection of my predecessor." Evidently, the drawing is of one of the forceps in Edinburgh.

In another communication Sir A. R. Simpson‡ reminds us that Smellie procured *a pair of the forceps described by*

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*Operative Midwifery. Dublin, 1849, Pl. iv. fig. 7.
†Obstetrical Transaction Edinburgh, Vol. VIII, page 1, 1883.
‡The invention and Evolution of the Midwifery Forceps, Scottish Med. and Surg. Jour. Dec. 1900.

Butter, which he found unsatisfactory. Smellie set out to London and Paris in 1739.

Charpentier* says: "In 1733 Dusee modified this forceps (*i.e.*, Palfyn's *mains de fer*) by increasing the curve of the blades and adapting to the handles two hooks turned outward."

Ingerslev† lays great stress on the fact that Palfyn was the first to make public the midwifery forceps and explain its use. He, also, points out that Dusee played a leading part in the history of obstetrical forceps, being the first man in Continental Europe to devise an instrument with crossed handles. He adds that Dusee was ignored in his own country in his life time as he has failed to find any mention of Dusee in any French work prior to the date of Butter's demonstration.

Ingerslev's illustration of Dusee's forceps (see fig. 105) is apparently not the same instrument as the forceps in the museum of the Royal College of Surgeons, England. The latter seems almost identical with that presented in the drawing from Butter's work. Ingerslev represents a forceps undoubtedly Dusee's as the locks and the non-fenestrated blades are made broader and the handles shorter than in the illustration of the instruments (see fig. 103) in the museum of the Royal College of Surgeons of England. Perhaps however, the artist may have been at fault. If not, Doran asks, where is the forceps from which Ingerslev's drawing was taken?

Smellie's actual experience of Dusee's forceps is dated 1737 or four years after Butter had exhibited the instrument at Edinburgh. Dusee's instrument was honoured by Smellie as it was the first forceps that he made use of. Smellie set to work to test and to devise instruments for the saving of the child when the head was arrested in the pelvis. He, therefore "procured a pair of *French* forceps according to a draught published in the Medical Essays by Mr. Butter, but found them so long and so ill-contrived that they by no means answered the purpose for which they were intended." Smellie also states: "After Mr. *Chapman* had published a delineation of his instrument,

*Cyclopedia of Obs. and Gyn. William Wood & Comp., Vol. IV, 1887, p. 51.

†Die Geburtszaunge, 1891.

which was that originally used by the *Chamberlains*, the French adopted the same species, which among them went under the denomination of *Chapman's* forceps."

Thus Dusee's forceps, of high interest in the history of the development of that instrument, was tried and found wanting not only by the great Smellie but also by the Inventor's own pupil De Wind. The latter shows that Dusee died somewhat prematurely and implies that possibly he had never used his own forceps. Perhaps then had he lived he might have devised some at least of those improvements which his contemporaries, who outlived him, were able to make and to establish.

Levret spoke well of Palfyn and dwelt at length on the merits of his instrument. He* further wrote most instructively on improvements made by others, referring to novelties in the mechanism of the blades, especially as to the lock or hinge. Palfyn's instrument had no lock, it was not even crossed. Levret wrote about the different means by which other obstetricians endeavoured to make the blades act well together even if detachable. The claims of Le Doux and others caused confusion as is to be found in Mulder's *Historia Forcipum* where there is a *forceps incogniti* which later on in Kilian's Atlas was ascribed to Palfyn. When Levret speaks of the methods already adopted, he shows how a hook joining the blades and then, in preference, a big screw, the blades being crossed, proved alike unsatisfactory. Then two locks were devised, each to be used when required but this forceps, Dusee's in fact, proved unsatisfactory.

For some reason not explained Levret makes no mention of Dusee in the above criticism of his forceps. Yet, when he treats of the modifications of the ends of the blades, he states that after extreme breadth had been tried and proved objectionable Dusee introduced the concave notch at the moderately broadened free end of each blade.

Thus in 1747 at least, Levret recognised Dusee as the contriver of a forceps concave at its end, but did not seem aware that Dusee introduced the second lock, though he had apparently

*Observations sur le causes et les accidens de plusieurs accouchments laborieux. Paris 1747.

read Butter's paper. Levret never stated that Dusee ever used his own forceps, yet he implies that others used it and found it unsatisfactory. The discrepancy about the second lock is not clear. Perhaps Levret happened to know that Dusee did not invent it, but for unknown reasons concealed the fact.

The following description is reproduced from Doran's Descriptive Catalogue (1921):—

"Each blade and handle is forged in one piece, the blade being elastic. Each handle is cylindrical and ends in a blunt hook turning upwards for 2½ in. (6.35 cm.); above, the handle ends as a solid block of steel into which two depressions are cut to receive blade and screw. Thus there are two locks 1¾ in. (4.4 cm.) apart; one thumb screw or screw plug serves for both. The blades cross at the lock. This mode of locking allows of three adaptations if necessary, so that the instrument may be used as a long forceps, a short forceps or an asymmetrical instrument such as was devised by David Davis and Radford.

The blades are not fenestrated and are of a curvilinear form, the first curve being about 60° outward from the handle for about half its length and the inner or return curve about 85° terminating in ends with a concave notch to prevent pressure on the temporal arteries of the fœtus. There is no pelvic or perineal curve.

Dusee never described his own forceps although he wrote on Obstetrics. According to his pupil, De Wind " 't Geklemd Hoofd geredt" (1751), another pupil Boswell procured for Butter the sample which was made public in Edinburgh in 1733 ("Medical Essays and Observations" Vol. 3, 1737). Smellie employed it and found it unsatisfactory. Its deficiencies apparently suggested to him the pelvic curve. (Smellie's "Treatise on the Theory and Practice of Midwifery," New Sydenham Society, Ed. vol. I, p. 214; vol. II. pp. 250, 375).

See Doran "Dusee, His Forceps and His Contemporaries" *Journ. of Obstet. and Gynaec.* of the *Brit. Emp.* vol. XII. p. 119; and "Dusee, De Wind and Smellie" ibid, p. 203.

1733. Chapman.

Edmund Chapman was a surgeon and man-midwife who practised for several years at South Halstead, in Essex, before

settling in London, where he became the second public teacher of Midwifery. He was the first person who publicly made known the forceps.

The measure and dimensions of the forceps as inserted in the third edition of "A treatise of the Improvement of Midwifery by Edmund Chapman" London, 1759, after page 92, are as follow:

Their length in a right line fifteen inches. Their length of the bows from the joint, where the two parts cross, to the upper extremity, in a right line, nine inches and one quarter. The girt of the bows when shut, is in the widest part, eight inches.

N.B.—Fig. I represents one part of the forceps, Fig. II. the whole not quite shut. Chapman's forceps did not differ from that of Giffard except for the mode of articulation which was not effected, with a screw. Each branch was provided with a mortise and they were fixed merely by applying one on the other. How he came to improve his forceps and to modify the articulation, will appear from extracts from his book which are quoted below.

Edmund Chapman was a distinguished contemporary of Dusee and a man of note. The first edition of his *Essay on the Improvement of Midwifery*, was published in 1733. In his preface he says "If I mistake not I am the first Englishman that has written originally and professedly on this subject, one only excepted who wrote about a *hundred* years ago and that very indifferently." He adds that "we are in this branch very much beholden" to the works "only translated from the *French*." In the preface to the third edition of his "Treatise" he says:—"When I published the first edition of this work I thought myself at least, the second *Englishman* who had written professedly on the subject. I have since found I was mistaken. For. Dr. *John Mowbray* has given the world a large treatise . . . ." That ingenious and laborious author declares strongly against the use of frightful instruments and in this I heartily join; but can not think the *forceps* deserves that appellation. He adds: "All I can say in praise of this noble instrument must necessarily fall short of what it justly

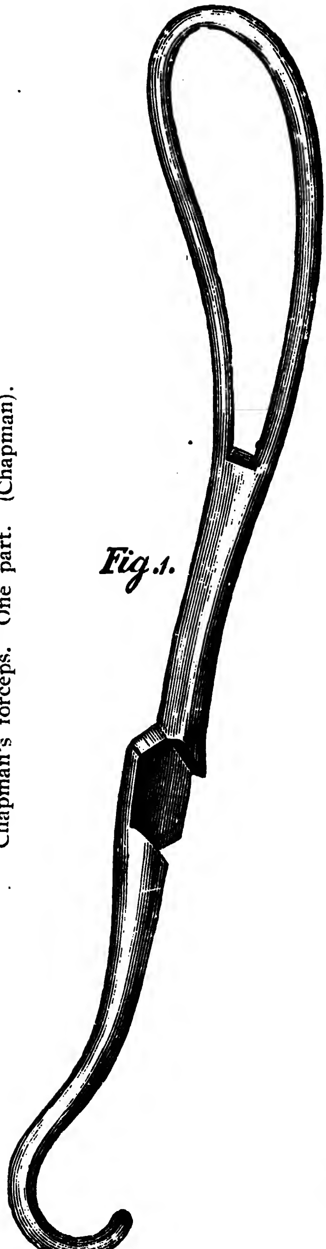


Fig. 108.
Chapman's forceps. One part. (Chapman).

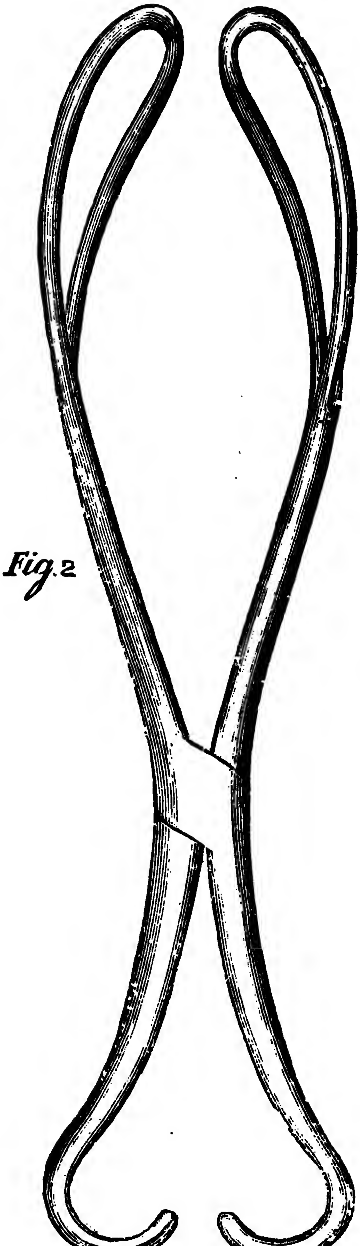


Fig. 109.
Chapman's forceps. Complete, not quite shut. (Chapman).

demands. Those only, who have used it, and experienced the excellency of it, to their own advantage and the security of their offspring can be truly sensible for its real worth. As I think myself in duty bound to recommend it strongly to the gentlemen of my profession, I shall omit no opportunity of endeavouring to do it justice."

The following extracts from the preface reveal Chapman's strong condemnation of hooks and advocacy of forceps. "The use of hooks and some other instruments by which living children, presenting with the head, are destroyed when they might very easily have been extracted in a few minutes by the fillet or forceps, is in my opinion, a most cruel and unwarrantable practice. But yet, however inhuman, it is, to my certain knowledge, by some kept up to this day." "How necessary is it then, that men, who profess *midwifery*, should make themselves masters of either the forceps or fillet? . . . . the former of which I prefer, because I can pass it with more ease to the woman; and the compression, caused by its use, makes the bones of the head ride one over the other, and thus reduces it to a smaller compass. To which may be added that the forceps gives me a much stronger hold of the child and enables me to draw it with more ease and security. But here I must observe, that as there are several different sorts of forceps, so they are far from being all equally proper; and great regard is to be had to their form. I once saw a pair at a noted instrument-maker's which I thought very faulty and was shown a pair by a brother practitioner in the country, which could not be used with either success or advantage ; the diameter of the curve being too large and its bows too short."

In the first chapter he dwells on "the method of saving a child whose head presents and lies fixed in the pelvis and must of necessity be born that way." There are two ways of saving it, "*viz.* either by slipping a fillet over the head, in such a manner as to extract the child thereby (which I have sometimes done with great success) or by taking the head with the forceps" Neither he adds, can be of use "if the head does not lie very low." As for the fillet, "I must beg leave to be silent in, as being entirely an invention of my own" and

claims Dr. Chamberlen's secrecy as a precedent. "As to *forceps*, which I think no person has yet any more than barely mentioned, it is a noble instrument to which many now living owe their lives as I can assert from my own knowledge and practice." Of course when we remember that Dr. Chamberlen's forceps were probably in use in 1640, "yet" and "barely mentioned," written in 1733, sound sarcastical. It is odd that Chapman should word the sentence above quoted in that manner directly after his open declaration that he has followed Chamberlen's example as to his (Chapman's) fillet. He, however, immediately proceeds to proclaim his forceps and explains its use, which he does very well indeed.

With regard to the instrument itself the following statements are worthy of note. "It is much better as I have just observed, that the two parts of the forceps should not be joined or fixed together by a screw."

Chapman then relates how he fashioned a movable screw which could be taken out. "And Mr. *Giffard* in case XIV and elsewhere frequently complains that his *extractor* slipt, which I am fully persuaded it would not have done, if the parts had been left unjoined, as I now use them. I do ingenuously confess that I came by this hint and improvement by mere accident, as I believe is frequently the case in discoveries of the greatest importance."

"For many years my forceps happened to be made of so soft a metal as to bend or give way or suffer some alteration in their curve." They were made as usual with the screw fixed to one part or side of them. These I used for some years; but they often happening to slip off sideways, as before mentioned, my opinion of the instrument was so much lessened that for many years after I used it but seldom and even not once in the space of ten years. During which time, when the child could not be turned, I employed the *fillet* only. At length, I caused another pair to be made me of better metal and some other improvements, the screw part being contrived to take out and not fixed, as in the former. This screw I happened to lose in the *cloths* at the delivery of a woman; who with her child is now living and in health in town; and

being sent for to another presently after and being indeed forced to make the trial, found that the instrument did its office much better without the screw or the two parts being fixt."

The second edition of Chapman's treatise appeared in 1735. At p. 27 the author says:—"I must acknowledge myself short, in not giving the figure of my forceps in the former edition. I was not indeed so thoroughly sensible of this defect till I found my *essay* honourably mentioned by a learned society established at Edinburgh for the improvement of physic and surgery, in the Medical Essays and Observations etc., vol. III. Art. XXXI. As these gentlemen by saying I have not given a description of that instrument, as I used it, seem to insinuate that something is wanting to render this work more complete and satisfactory; I have now subjoined an exact draught of my forceps, which is very little different from that used by the late Mr. *William Giffard* and which I apprehend too of a make preferable to those represented in Table V of the *Medical Essays*, etc., as taking better hold of the child's head than can be done by an instrument whose curves are broad and not divided and formed into a sort of ring as in the figure here exhibited; in which the most protuberent parts of the head lie naked, whereas in the extractors last mentioned the whole is covered and the instrument of course takes up more room."

What this somewhat clumsily worded criticism refers to is evident. For Chapman is quoting from the same volume as that which contains Butter's report on Dusee's forceps. At page 403 of the *Medical Essays* the "insinuation" will be found. "He (Chapman) condemns the make of the extractors he has seen others employ but does not describe his own, nor his manner of slipping a fillet over the child's head." With the latter reproach we must all agree. Again "those represented in Table V of the *Medical Essays*" are Dusee's. The drawings of Chapman's forceps looking after the English fashion without a screw, are instructive. So much for the relations of Chapman to Dusee, chronological and professional.

Butter reproached Chapman for keeping the form of his

Mr Giffard's Extractor

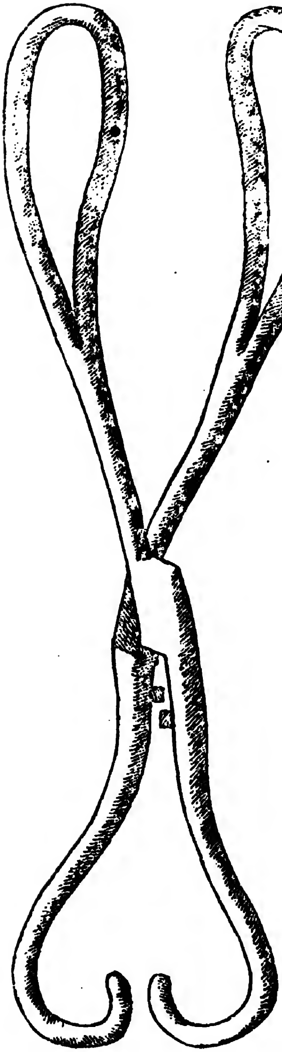


Fig. 110.
(Giffard).

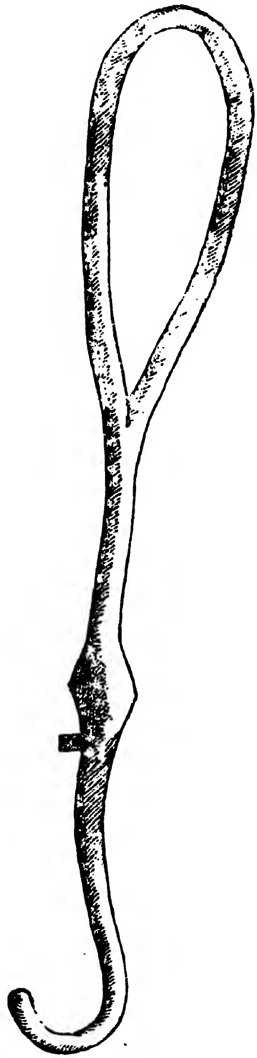


Fig. 111.
(Giffard).

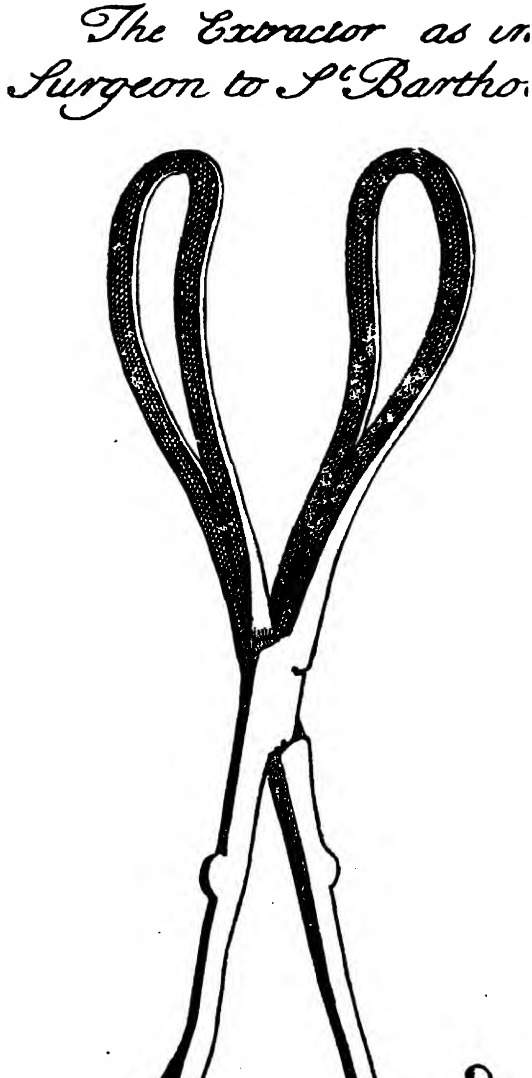


FIG. 112.—Freake's Forceps (Giffard).

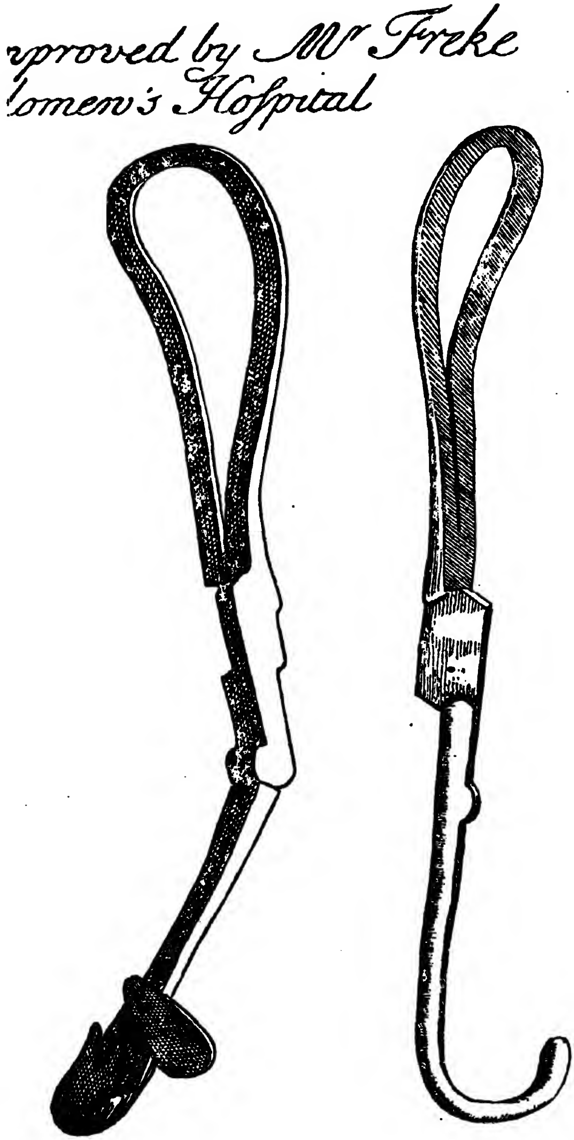


FIG. 113. FIG. 114.
Freke's Forceps (Giffard).

forceps a secret. In 1736 John Douglas, Surgeon to the Westminister Hospital also took Chapman to task for having kept his secret so long. Douglas wrote after the second edition of Chapman's Treatise had appeared in 1735. A man who openly declares that he keeps his fillet secret but publishes his forceps, naturally lays himself open to criticism. A century later Von Siebold implied that Chapman was really forced to declare himself about his forceps by Butter when that surgeon made Dusee's instrument public.

Chapman made the following observation :—
"The secret mentioned by Dr. Chamberlen by which his father, two brothers and himself saved such children as presented by the head but could not be born by natural pains, was, as is generally believed, if not past all dispute, the use of the forceps, now well known to all the Principal men of the profession both in town and country." Thus Chapman publishes the fact that the forceps was in general use in 1735 and although implies that he did not learn its use from the Chamberlens, does not explain, how he came to know, the use of the forceps. It should be mentioned, however, that he did not make any claim as regards the discovery of forceps."

1734. Giffard and Freke.

William Giffard, a surgeon and man-midwife, was one of the first, after the Chamberlens, to use the forceps; the first case in which he used the instrument occurring on April 20, 1726. This is the earliest record of the use of forceps.

In 1734 Edward Hody published an account (with illustration) of the forceps employed by Giffard which, subsequent to Chamberlen was the first instrument of its kind with fenestrated branches. He also mentioned about the forceps modified by Freake, Surgeon of St. Bartholomew's Hospital. The branches were articulated by a needle, passing through corresponding holes, in a sort of tablet in each of them, crossing each other. Giffard described many cases in which his extractor was used with success beyond all expectation; on the other hand there had been cases in which the extractor

failed to get a good grip of the head and slipped necessitating extraction of the child by embryotomy.

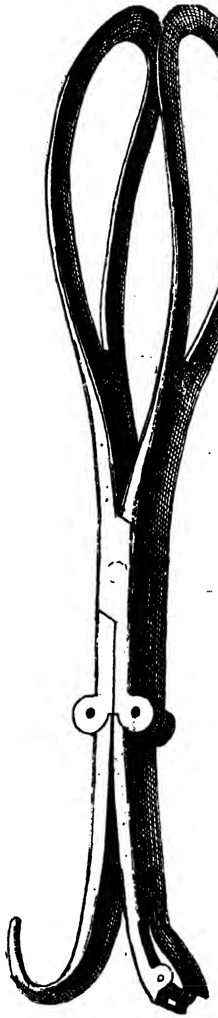


FIG. 115.
Freke's Forceps.
(Kilian).

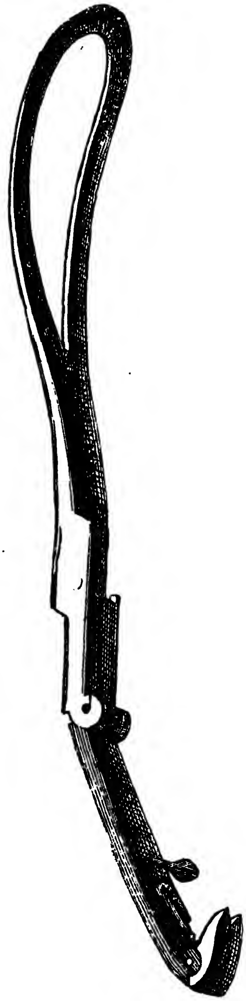


FIG. 116.
Freke's Forceps.
(Kilian).

Case XXIII gives Giffard occasion for the following remarks: "This case proves, that a child presenting right, but sticking in the passage may be brought alive (I won't say always) without either the use of hooks or lessening the head, contrary to the opinion of most former writers." It appears, however, that Giffard's forceps was not of well-tried strength as the following remarks from the Case XXVI will show:— "I passed my extractor on each side of the temples and drew strongly towards me, by which one of the branches (which upon examination I found was before cracked through) gave way and I was forced to send home for another."

FIG. 117. Giffard's Forceps. (Witkowski).

William Giffard was a distinguished contemporary of Dusee. He is honorably mentioned in the Scotch *Medical Essays* and Observations Vol. III. p. 400 in a summary of medical work "since the beginning of the year 1733"—the edition here quoted from was published in 1737, but the summary was apparently prepared and read at the end of 1733 or early next year. This summary makes mention of Giffard's "extractor." It would be interesting to turn to Giffard's book* revised and published by Hody in 1734 (the year after Butter exhibited Dusee's forceps). Hody's dedication to John Hollings is dated "London July 30, 1733." Hody stated that Giffard "was a plain man, remarkable for an honest frank behaviour." Hody's ethics were sounder than Chapman's.

Opposite the first page of Giffard's book, is a plate representing "Mr. Giffard's extractor" (Figs 110 and 111) and "the extractor as improved by Mr. Freke, Surgeon to St. Bartholomew's hospital." The plates were prepared in 1733

*Cases in Midwifery; written by the late Mr. William Giffard, Surgeon and man-midwife. Revised and Published by Edward Hody M.D. and Fellow of the Royal Society, 1734.

MULDER. TAB. I.

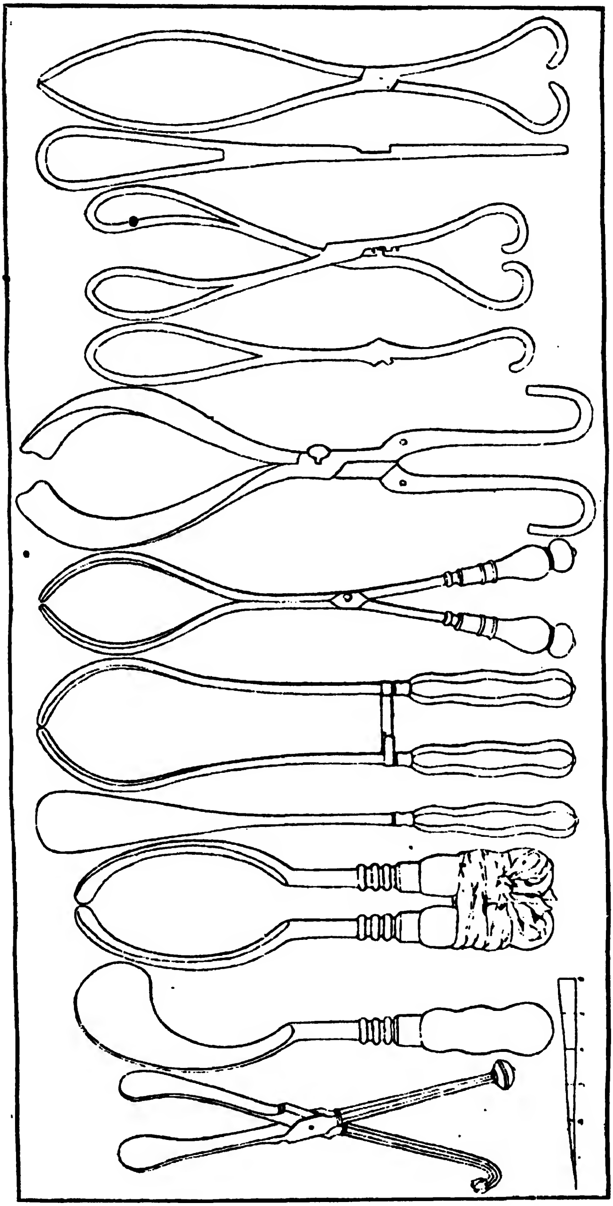


FIG. 118 119 120 121 122 123 124 125 126 127 128
Ruyff. Palfyn Palfyn I. Palfyn II. Unknown. Dusee. Giffard. Chapman.

at the latest and published in 1734. The "extractors" are midwifery forceps. Chapman admits that his forceps were modified from Giffard's. Whilst Chapman contrived the English lock devoid of a screw or a pivot much as it is now constructed. Giffard, according to the drawing of his instrument, had already discarded the pivot, but had fixed a short catch on the inner side of each blade immediately below the hinge. In Giffard's forceps, as in Chapman's, the handles bear hooks (not rings) which turn inwards, whilst in Dusee's the hooks are everted, later French obstetricians adopting that pattern. But whilst Freke, like Chapman, made his forceps with a simple English lock, the hook on one blade served as "a blunt crotchet" and on the other bore "a flap that shuts down and covers a sharp crotchet." (Figs. 112—6 and 135—7).

Giffard's work contains full reports of 225 cases. The date of the first is "January the 5th 1724-5" of the last October 17, 1731 (*i.e.*, 2 years before the exhibition of Dusee's forceps in Edinburgh. In case XIV, which is dated April 8, 1726, Giffard used his extractor but was not able to fix it, so he perforated and delivered. Case XXIII occurred on June 28, 1728 and Giffard used his extractor with success, the child being born alive. In later cases recorded in the work, the forceps was often employed. Thus Giffard's forceps were in active service in 1726, were doing good work in 1728 and were reported in print in 1734. According to Hody, Giffard died March 6, 1730-31. Apparently Giffard never used Freke's forceps, which is figured in his *Cases in Midwifery*.

In his last instrumental labour (CCXVI) he speaks of "my Extractor." Hence, it may be assumed that the drawing of Freke's forceps were inserted by the editor, Dr. Hody. There appears to be no allusion to the Chamberlen forceps.

In England, the forceps was a *secret de polichinelle*. If Walker, the Chamberlen's relative, Drinkwater, Giffard and Chapman used it, surely others employed it. Yet Palfyn, after all, was the first man to make a forceps public, a queer very un-Chamberlen like forceps it is true. At that very time Dusee was probably using a forceps of his own, much more like and probably inspired by some knowledge of the invention of the

KILIAN'S ARMAMENTARIUM. TAB. XIV

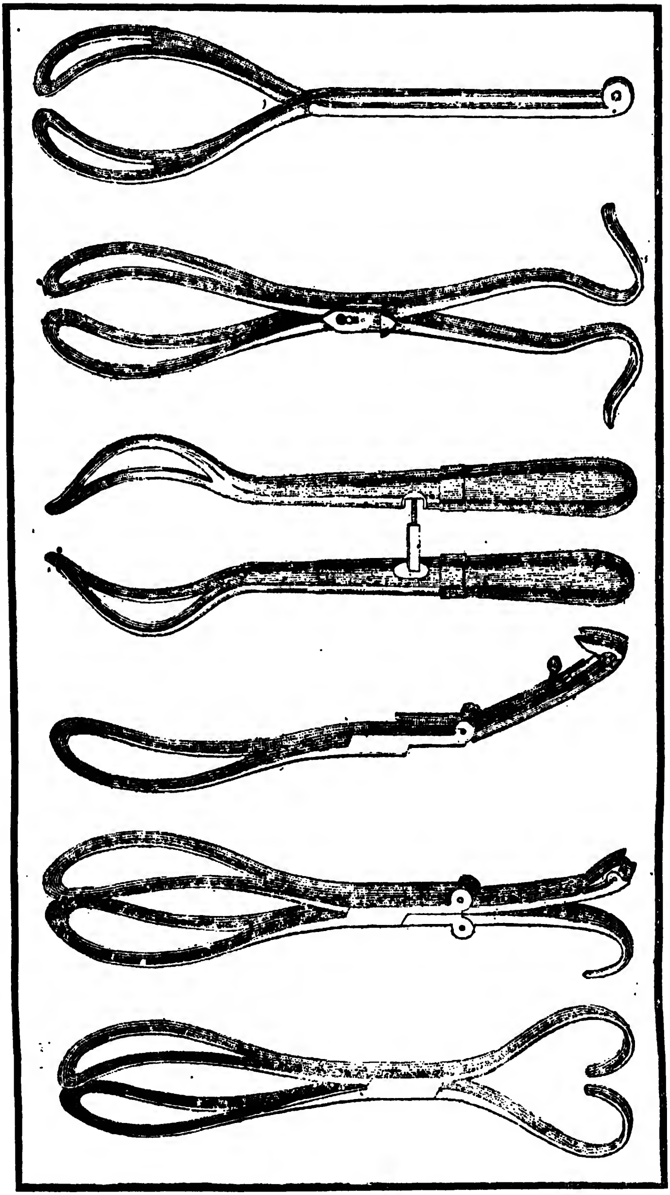


FIG. 129 Chapman. FIG. 130 Freke. FIG. 131 Freke. FIG. 132 Mesnard. FIG. 133 Gregoire. FIG. 134 Rathlaw.

Chamberlens. This problem can not be solved. It is certain, however, that Butter exhibited Dusee's forceps in 1733 and that he made observations on that occasion which together with the remarks of another writer in the summary appended to the *Medical Essays* led to the making known of the forceps to the profession in general. Hence Dusee occupies a prominent place in the history of the obstetric forceps.

1736. Walker.

Dr. Walker a grandson and the last survivor of Dr. Peter Chamberlens obstetric progeny, was said to have been the inventor of the English lock of the obstetric forceps.

The first mode of articulation by a notch or a hinge may be dated from 1736. Giffard and Chapman recommended articulation of the blades by not joining them too firmly but this was not adopted by their fellow practitioners. Some clever men directed all their attention to obtain a more stable articulation. Mulder describes and depicts a forceps (see Tab. II, Figs. 4 & 5) invented by an unknown person (? Dr. Walker) in that year. The blades are fenestrated and the ends rounded; but what distinguishes it from all kinds of tractors employed so far, is its mode of articulation which is the essential and peculiar character of Smellie's forceps. In fact at the level of the crossing of the branches, there is no half iron tablet nor a screw and a female screw. The branches slide on each other in the manner of articulation, known as hinge-joint, which is effected by means of a simple indentation or notch at the side of one of them. When articulated they are sufficiently firm and afford each other support. These branches are round and terminate like hooks turned outwards. (See p. 108 ante).

1741. Mesnard.

Jacque Mesnard,* Surgeon of Rouen states, "The instrument that I have invented may be called an anti-crotchet. With it, I extract very easily an infant whose head is impacted in a

*Journal de Verdun, April, 1741, T. XLIX, p. 265.

MULDER. TAB. II

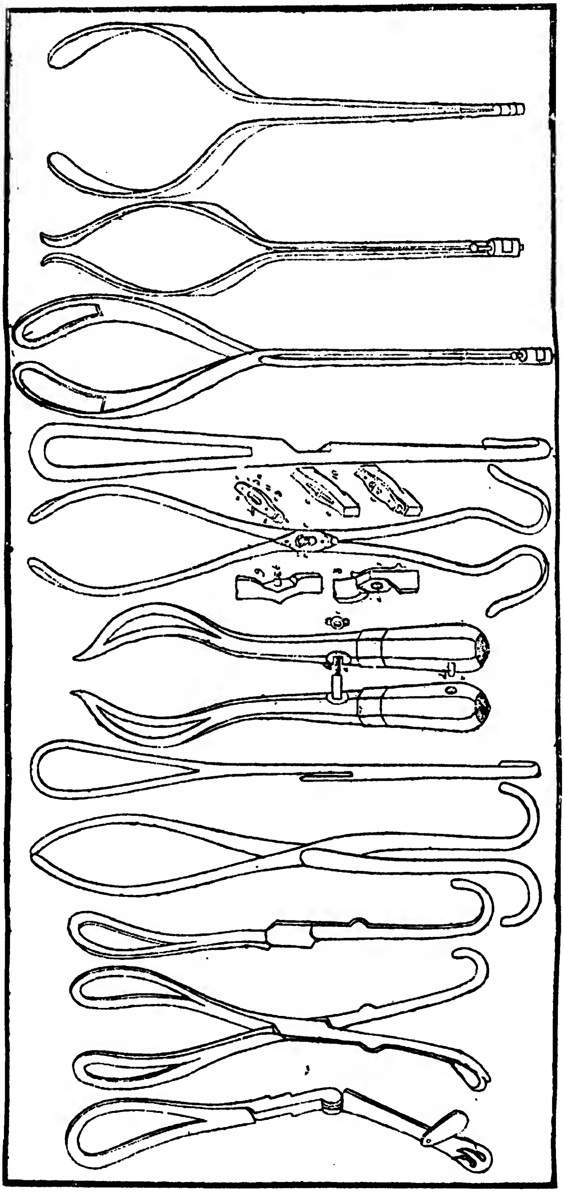


FIG. 135 136 Freke 137 . 138 Unknown (? Walker). 139 140 Mesnard. 141 Gregoire. 142 143 Rathlaw I & II. 144 145 Schlichting.

narrow pelvis. Moreover, I am not compelled to request a father, a husband or an assistant, whether the mother or the child should be allowed to die. My instrument is very simple and is constructed in accordance with geometrical rules, drawn from the shape of the space between the bones of the pelvis and the shape of the head of the fœtus which must pass through."

Mesnard was not satisfied with this self-important announcement, but two years later published a book* giving, an illustration of his *tenette a cuillers* (forceps with spoons) which was intended to save both the mother and the child.

It may be seen that the forceps of Mesnard (see Figs. 132 and 140) is composed of two fenestrated branches slightly bent at their extremities. They are brought together by means of a screw fixed to the male branch which fitted into an opening in the female branch. (For measurements, see Appendix).

1742. Ould.

It is quite possible that Fielding Ould did possess a forceps, for, in his book "A Treatise of Midwifery, published in Dublin in 1742," he alludes to it on p. 153, as follows: "The best adapted instrument is the large forceps, which is in general use all over Europe." (Continued on page 267).

1746. Gregoire.

Gregoire, Surgeon of Paris tried to improve the forceps. He himself did not give any description of his own instrument, but P. A. Boehmer† (who translated Manningham's work into Latin, and who introduced this forceps into Germany) did so. Mulder and Kilian also reproduced drawings of Gregoire's head extractor. Of the 7 figures in Mulder, five are devoted to the complicated lock while Kilian's drawing has a lock much less complicated. A pivot projecting from the lower blade passes through a hole in the upper. The spoons of this instrument are fenestrated and flattened at the ends (see Figs. 133, 141 and 142).

*Guide des accoucheurs, Paris 1743 in. 4°.

†Artis Obstetricariæ Compendium tam Theoriam quam Praxin. Halle, 1746.

Doran* exhibited before the Royal Society of Medicine and described a sample of Gregoire's forceps preserved in the

FIG. 146.—Gregoire's Forceps. In the Museum of the Royal College of Surgeons. (Doran).

FIG. 147.—Gregoire's Forceps. In the Museum of the University of Edinburgh. (Doran).

*A demonstration of some eighteenth century obstetric forceps, by A. Doran. Progs. Royal Soc. Med. Vol. VI, Part II Sec. History of Medicine, p. 54, 1913.

Museum of the Royal College of Surgeons, England. The instrument is of the type designed by Gregoire fils and is a good sample of a French forceps in general use before Levret devised the pelvic curve. The above sample differs from the Gregoire's forceps represented in Mulder's work in that the blades are much straighter and the lock is far less complicated, whilst the handle of one blade was furnished with a crotchet. In this sample the appended crotchet has been lost but in another preserved in the Obstetrical Museum of the University of Edinburgh (Fig. 147) it remains intact. Freake, Surgeon to St. Bartholomew's Hospital, devised a similar crotchet arrangement, figured in Giffard's book edited by Hody, without

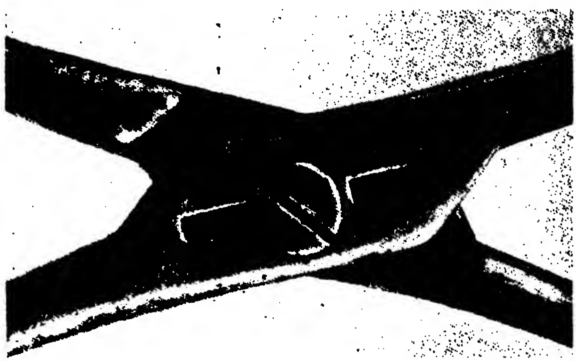


FIG. 148.—Gregoire's Forceps.
Royal College of Surgeon's Sample; showing two slots divided transversely; the screw has been fixed just below the metal crossing between them. (Doran).

any detailed description. Doran failed to find any other record of Freake's forceps. The crotchet was formed by the handle turned inwards and bifurcated and was covered in, when not required, by a guard, a flat oval piece of metal, attached to a pivot on the inner side of the handle. In the photographs of the Edinburgh specimen, there may be seen a hinge on the extremity of the handle, turned inwards. The crotchet was a

separate piece of metal, bifurcated at its free end and attached at its opposite extremity to the hinge (see Figs. 133, 141 and 142). There was an oval metal guard, as in Freake's forceps, but it was slightly concave and arranged so as to fix the crotchet when required or to cover it in against the inner side of the handle when it was not wanted. This arrangement would seem to be an improvement on Freake's device adapted to a French instrument. Yet it is possible that it is an original idea of Gregoire's which Freake simplified and adapted to an English forceps.

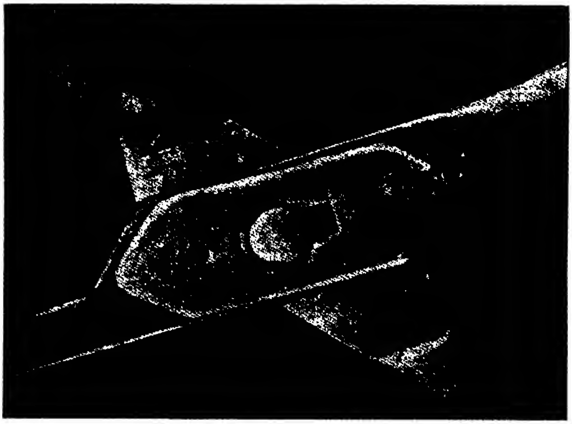


FIG. 149.—Gregoire's Forceps.
University of Edinburgh Sample.

The arrangement of lock shown in Kilian's drawing is also present in the Edinburgh Gregoire's forceps (see Fig. 147). The lock of the college museum sample is shown in Fig. 148. Dr. J. B. Hellier, Professor of Obstetrics in the University of Leeds, has described and figured a Gregoire forceps belonging to the museum of the University of Leeds*. The lock is of the same type and there is a sliding bolt which fits into a groove round the neck of the pivot and grasps it firmly. The screw arrangement in the lock of the Royal College Museum sample is simpler than the pivot in the Edinburgh sample. A plain

*British Medical Journal 1912, i, p. 1027.

screw is fitted into a slotted joint which allows of radial deviation : two slots are seen in Fig. 148 the lower separated from the upper by a narrow bar of metal, and the screw has been fixed in the lower slot—namely that towards the handle—an arrangement which suggests Dusee's forceps with two locks.

FIG. 150.—Sharp Crotchet in the handle of Gregoire's forceps, ready for use. (Doran).

As the screw bears no thumb piece, a screw driver must have been employed in order to fix or remove it.

FIG. 151.—Sharp crotchet in Fig. 150 closed and covered by guard. (Doran).

These variations in the lock of several forceps of the Gregoire type suggest that it was soon found to be much too clumsy, as devised in Gregoire's original instrument. Hence arose the adoption of simpler locks as in Edinburgh instrument,

where a sharp crotchet arrangement is added to one handle. Possibly Gregoire himself simplified the lock. We only know of his original forceps through Boehmer, so Gregoire might have altered it after his German pupil had ended his pupilage.

The handle of one blade is less convex outwards in this instrument than in the typical Gregoire's forceps. The blades are very long, 8½ in. (21.5 cm.) measuring with the handles, 17 in. (43.2 cm.), the curve is wide, the extremities 1¾ in. (4.4 cm.) in breadth and broader than the bases, are not curved abruptly inwards as in Mulder's drawing. The fenestræ measure in length 7½ in. (19 cm.) and are cut square near the lock, ¼ in. (0.6 cm.) wide, not ending in a point as usual ; perhaps this was done to lighten the very heavy instrument as much as possible. The greatest space between the closed blades is 2⅜ in. (6. cm.) whilst at their extremities they almost touch, as in Smellie's forceps. Mulder gives a space of 1¼ in. to his Gregoire's forceps. The compressive power of this instrument which weighs 1 lb. 9 oz. (702 grm.) must have been dangerously strong.

Dr. Hellier gives the following description of the instrument in the museum of the medical department of the University of Leeds. "It was presented by Mr. J. A. Nunneley, M.B., and was the property of his father, who collected many curios. It appears to correspond with a pattern that bears the name of Gregoire fils, dating from the first half of the eighteenth century.

The two oldest patterns of forceps known are: First, the original Chamberlen forceps, preserved in the library of the Royal Society of Medicine, with which I have carefully compared the instrument about which I am now writing ; and, secondly, Palfyn's forceps. Palfyn's instrument was almost certainly not derived from Chamberlen's, but was designed by doubling the "crochet en cuillier" of Ambroise Parè, and to this Gregoire's pattern shows no resemblance. To Chamberlen's instrument, however, its likeness is obvious. Certain differences are obvious also, especially in the lock. Chamberlen's earlier pattern has no lock ; the later has a pivot joint of simpler form. The pattern here shown is characterized by a very ingenious lock,

which consists of a pivot rising from the lower blade and passing through a hole in the upper. It is secured by a sliding bolt, which fits into a groove round the neck of the pivot and clasps it firmly.

Midwifery forceps were first described in European literature by Giffard in 1734 and Chapman in 1735 ; their instruments are obviously modifications of Chamberlen's but do not correspond with Gregoire's. Levret's famous forceps (1747) resembles Gregoire's in some points, but differs by the presence of the pelvic curve and in the details of the lock.

Gregoire's forceps is figured in a very interesting work by Dr. E. Ingerslev of Copenhagen, Die Geburtszange, Eine Geburtshufliche Studie. Stuttgart, 1891. The sliding bolt is present and the pattern appears to correspond almost exactly with the instrument in my possession.

The Gregoires, father and son, had an extensive midwifery practice in Paris in the first half of the eighteenth century, although they have left no contribution to the literature of their time. Gregoire fils had a pupil, Boehmer, who became professor in the University of Halle, and who in 1746 published an account of Gregoire's forceps, and this is said to have been the first introduction of forceps into Germany. This instrument has cephalic curve which is shallower than the cephalic curve of modern instruments. The blades are perfectly straight, and there is no proper shaft, the fenestra coming quite near to the lock. The instrument is very well made in steel, and weighs only 15 oz. The total length is 15 in., the blades are about 1⅝ in. wide, the greatest distance between the two blades is 2⅝ in., and the distance separating the tips is 1½ in.

I think that a low forceps case could be very well delivered with Gregoire's forceps, but for high cases it would be inefficient and dangerous.

I have no further means of determining when and where this instrument was made, but it certainly corresponds to Gregoire's pattern, and this is of historic interest as being the first known in Germany. I should be much obliged to any connoisseur who could give me further light on the subject.

Ingerslev's figure is copied in Winckel's Handbuch, Bd. iii, T. 1, S. 484, but Ingerslev's original work gives fuller details."

Dr. A. Cordes (Geneva) writes thus in the B. M. J. of 1st June, 1912:—"The forceps described by Dr. Hellier in the British Medical Journal of May 4th, p. 1027, is exactly the same as that he can see in Kilian's Armamentarium Lucinæ Novum, Plate XIV, Fig. 5, and also in Kilian's Geburtschulflicher Atlas, Plate XXXIV, except for the lock—a sliding piece and a key for the screw. Its length is 17 English inches, and their weight 870 grams; the greatest distance between the fenestræ is 2½ in.; the distance between the tops is half an inch. The fenestræ have a groove. Dr. Hellier could find much information in Mulder's Historia Forcipum et Vecticum (1794)."

The following description is quoted from Doran's Descriptive Catalogue.

"Each blade and handle is forged in one piece of steel. The handles are smooth, rather slender, bowed somewhat outwards and not lined with wood or covered with leather. One handle is everted at its extremity, the other is turned in and bears a hole to which was fitted a sharp crotchet on a spring which has been lost. The lock is a plain screw fixed into a slotted joint to admit of a radial deviation, as the screw bears no thumb-piece a screw-driver would have been required to fix or remove it. The fenestræ are 7½ in. (19 cm.) long but are narrow. There is no pelvic curve and the cephalic curve is but slight. The blades are flat on their inner surface and their edges are thick and blunt."

Description of this instrument in the *Progs. Royal Soc. Medicine, Sect. His. of Med.*, Vol. VI, 1913, pp. 54—76. "The blades of handles are straighter than in typical Gregoire's forceps, originally described by Boehmer. In Coutouly's forceps the handles were similar, being long and relatively straight (Mulder, "Historia Forcipum" pl. X., Fig. 1) but the blades bore the pelvic curve. The crotchet arrangement is a modification possibly suggested by Freake's instrument (figured in Giffard and Hody's "Cases in Midwifery" 1734) unless Freake borrowed the idea from Gregoire. A forceps identical with this instrument but with the sharp crotchet and its guard preserved

complete, is to be seen in the Obstetrical Museum of the University of Edinburgh."

1747. Rathlaw.

This instrument had fenestrated blades like Chamberlen's and iron handles jointed at the extremity. It was probably the invention of Roonhuysen of Amsterdam, suggested by an instrument which he had bought of Hugh Chamberlen (see Figs. 134, 143 and 144).

1747. Schlichting.

Johann Daniel Schlichting published in 1747, a description and an illustration of an instrument, which is not much different from that of Rathlaw. He states that he knew the instrument for a long time and had seen it with Wilhelm Uwens, a surgeon of Amsterdam who had been associated with Brederode, a pupil of Freidrich Ruysch. It is not possible to determine, whether Roonhuysen sometimes used Schlichting's instrument or not.

Schlichting's forceps, like that of Rathlaw is made of two steel blades without fenestration. The blades are almost one finger broad, but the parts which hold the head are more curved than those of Rathlaw's forceps, and the ends of the blades are not bent backwards as in Rathlaw's. The manner of locking is the same as in that of Rathlaw's.

It appears that Schlichting used his forceps with elastic blades more as a dilator of the cervix than as an instrument of traction (see Figs. 95, 145 and 149).

1747. Levret.

(Introduction of the second or pelvic curve to the blades.)

Andre Levret (born in Paris 1703—died 22 Jan. 1780) has certainly brought about the most important improvement in forceps. He announced his invention to the Academie of Sciences on 7th January, 1747. He declared that with the straight forceps, when one thought he held the head across a certain diameter, he may only hold a part of the circumference near the neck, with the result that very often the instrument

FIG. 152.—Andre Levret. (1703—1780).

slipped. Sometimes it was impossible to extract the head or the perineum was injured, due to inevitable undue pressure exerted on it. Levret, by giving to the forceps a curvature at the margin of the blades, that is to say, in the direction in which the head has to move, brought about the most important improvement, which received the approbation not only of savants of his own country but of other countries too. So far the forceps had only one curve and that in favour of the child. Levret introduced a second curve, which was in favour of the mother. Moreover Levret made the blades more hollow so that the instrument could be applied more closely to the lateral parts of the fœtal head and would hold it more firmly (see Figs. 153, 154, 155, 159 and 160).

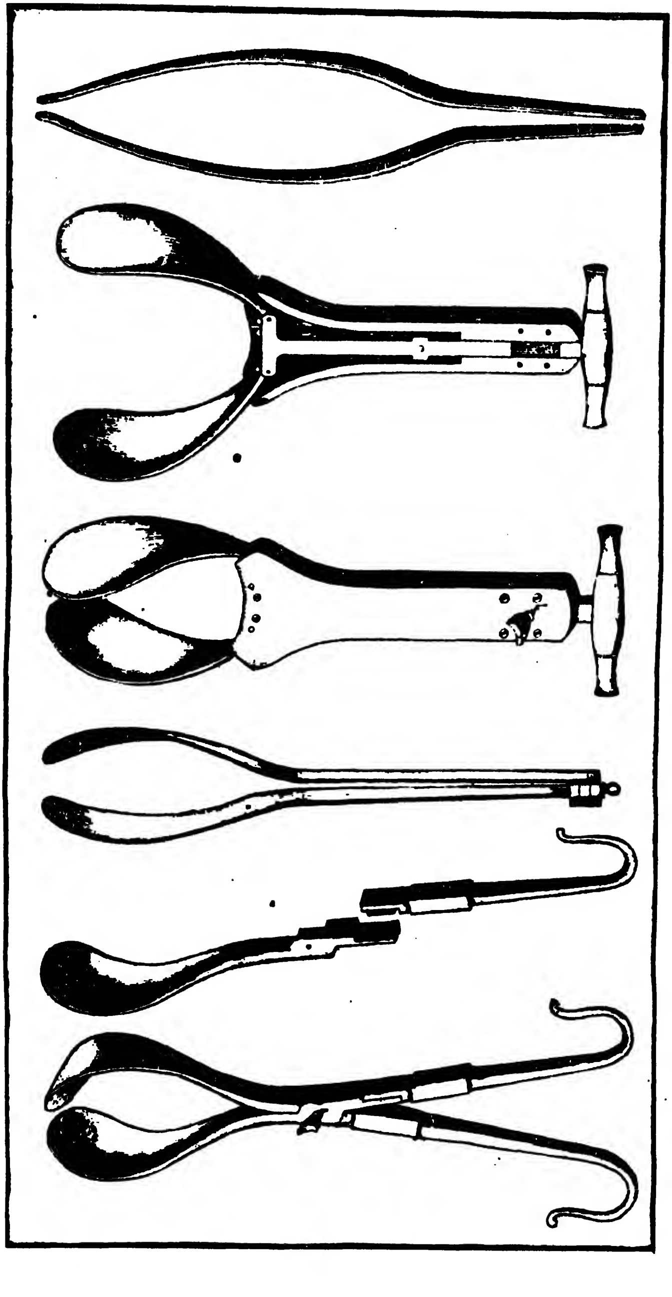
The following is a translation of Levret's* original account of his modifications of "Tire-tete de Palfin." "I hope to satisfy artistically inclined persons by giving a diagram of this instrument with the modifications which I have made in it. These modifications consist firstly in a sort of shallow groove of a small lip, situated at the internal edge, away from the *vuide* of the branches. This enables the various parts of the instrument to come more intimately in contact with the sides of the fœtal head, thus ensuring a stronger hold than by the instruments ordinarily used, in which the part indicated, is nearly half round across its width and which, for that reason, slips more easily.

It is worthwhile remarking that this modification can not in any way, be prejudicial to either the mother or the child and the instrument, is no less easy to introduce, as the modification does not change its curvature nor increases its roughness.

The second modification consists in the external part of the body of the instrument being covered over on both sides by a very thin plate, which slides lengthwise, and which remains applied to the surface by some tenons dovetailed, which slides in the mortises of the same figure which are made in the body of the piece, and which open above and below into three conical hollows ("trous") situated in the entablement at equal distances. The top of the three *trous* are exterior and they have at their

*Observations sur les causes et les accidens de plusieurs Accouchemens laborieux. Paris 1747, p. 92.

TAB. XV



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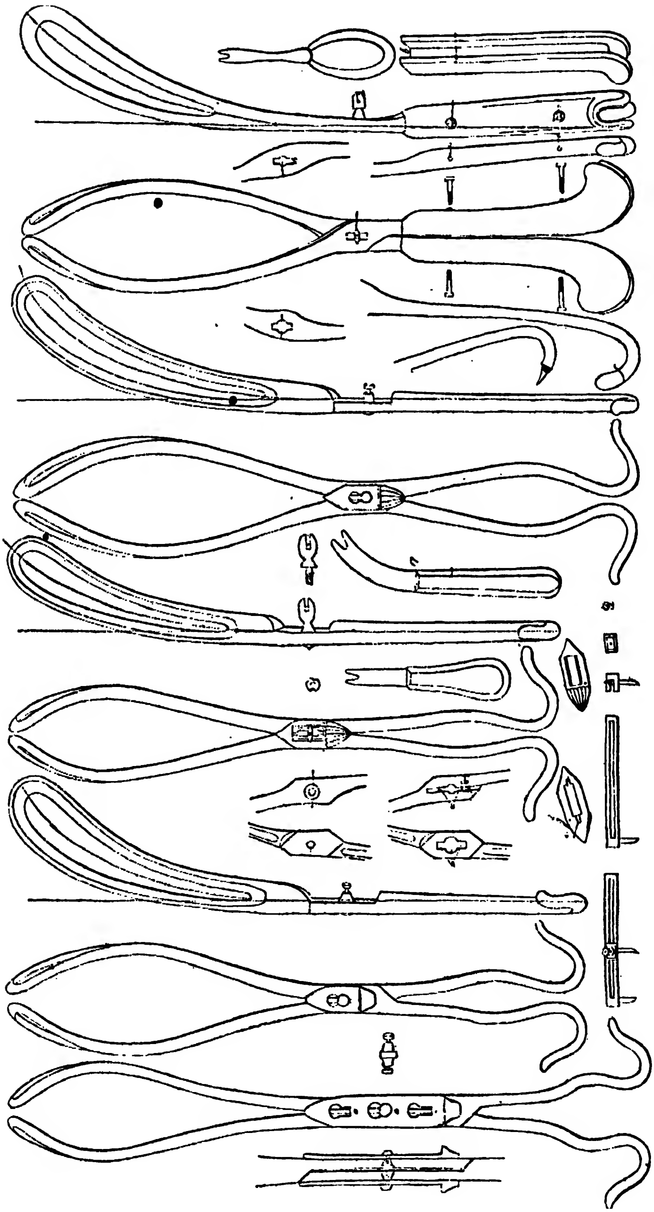
base, which is interior, a circular depression. The two branches of this forceps, are absolutely similar, and thus it differs very much from the one which is most used now-a-days, which has a male and a female branch, *i.e.*, one carries an axis, soldered or rivetted in its place and the other has a cylindrical eye, through which the former passes. In fact, the two branches are joined together by means of a groove and a small plate like mine, but which is pierced only at one place.

When one introduces into the Vagina, the two branches of the forceps and partly inter-crosses them, one places at will the axis into one hollow or eye of the instrument and by pushing the sliding plate by means of the thumb, one renders it absolutely fixed on this branch and then adjusting the hole in the other branch, which corresponds to the former and pushing the sliding plate, the articulation is found to be made perfectly and at will, *i.e.*, at one of the three places which one can choose according to the exigencies of the case; because the edge of the hole in the plate embraces the grooved collar of the extremity of the axis and by this means the whole becomes more firm than a rivetting.

This mechanism is so simple that I do not consider it necessary to enter into a greater detail; it is sufficient to visualize it, in Fig. 159. It is just as well to remark that before adjusting the instrument, it is necessary to arrange the movable plates in such a way that all the three holes are free. This will happen if one draws towards one the plate, by means of the thumb, which is situated below."

The following description of Levret's forceps is reproduced from Pinard's article in Dechambre's Dictionnaire Encyclopadique des Sciences Medicales:—

"Levret modified his forceps in three distinct stages: His first instrument, (of which he published the description in his *Observations*, etc., p. 92 *vide ante*), is straight 468 mm. long, the handles being 175 mm. The blades are curved and the internal surface of their edges, has a groove. At the point of junction of the two branches, each of them has a tablet with three holes pierced in it, at equal distances. The junction works by a mobile axis and sliding plates: (articulation



MULDER.

B

with a movable axis). The handles are metallic and terminate in blunt hooks, curved outwards. The cephalic curve is fairly well pronounced ; the sine formed by the blades measures 61 mm. at the broadest point ; the tips of the blades are 7 mm. distant.

The most important modification of this forceps was published in the *Observations*, p. 165, 1751. The instrument possesses the new or pelvic curve. When it is placed flat on the table, the perpendicular line to the tips of the blades measures 87 mm. The length of this instrument is 483 mm. of which 182 is for the handle. The greatest width of the sine of the blades measures 67 mm. The articulation is made by a fixed axis, situated in a tablet on the lower branch, to which corresponds an opening in the tablet of the upper branch and a grooved plate adapted at this point. (See Fig. 160).

Levret made the last modification in his forceps in 1760, which was published by his pupil Stein. The instrument measures only 418 mm. in length, its pelvic curve only 61 mm. the greatest divergence of the blades is only 54 mm. and the tips of the blades almost in contact with each other. The fenestræ are prolonged in the direction of articulation in order that one can pass a ribbon through them. The junction is made of a rotating axis and a grooved plate and one can turn the axis with the help of a key." (See Fig. 162).

Doran gives the following description of Levret's forceps in his "Descriptive Catalogue," p. 10.

"Each limb forged out of a single piece of steel. Handles long and stout, flattened externally, 1¼ inch (3.17 cm.) broad in the middle, bowed slightly outwards, roughened by deep indentations cut so as to make a herring-bone pattern. Handle of right turns outwards at a right angle and unscrews to adapt the handle to the purposes of a perforator. At the lock, the handles are flattened antero-posteriorly. A slot in the female or right blade receives a thumb lock attached to the left or male blade, the thumb lock revolving so as to fix the lock after it has been passed through the slot, as in Rizzoli's short forceps. The blades are stout, with a strong pelvic curve and are flattened on their inner surface, the lower extremity of each

fenestra is rounded with well-bevelled edges for the application of tapes.

This is the typical old French forceps representing the third and last modification made by Levret himself. The lock is of the simplest type (in the more modern "French lock" of Dubois, the screw is fitted into a lateral mortise, not a slot, in the opposite blade), the contrivance for passing a tape through the fenestrae, prolonged towards the lock was a feature from the first (*circ* 1760) in this modification, described by Levret's pupil Stein. The pelvic curve had already been introduced in 1747 by Levret. Smellie quite independently applied the *curvatura nova* to his long forceps in 1752. After Smellie and Levret had published accounts of their forceps with pelvic curve, Pugh of Chelmsford claimed that he had contrived a similar instrument about 1740 and used it freely. For Levret's latest writings on his forceps see his "Suite des observations sur les causes et les accidens de pleusieurs accouchemens laborieux," 1770 chapters "de l'utilite du nouveau forceps courbe" p. 163 and "addition a' l' histoire des forceps" p. 217. He figures his forceps, pl. ii. fig. 1. *loc cit,* the lock is not quite identical with that seen in this instrument, a broad-headed fixed pin instead of a thumb-lock fitting into the slot. See Charpentier's "Traite pratique des Accouchements" 1890 Vol. II, p. 680 for a clear summary of the development of Levret's forceps. This sample is probably modern.

The utilization of the ends of the handles for perforators and sharp hooks in Dubois' modification of Levret's forceps, became popular in France. Pajot taught his pupils that the perforator and sharp hook were placed there, he trusted, to remind them they should never be employed."

1750. Bing.

A description with a sketch of the forceps invented by Bing, Surgeon of Copenhagen has been given by Jean Gottfried Janck (*vide* commentatio de forcipe ae forfice ferramentis a Bingio inventis. Lipsiæ, 1750). This forceps is not fenestrated ; the blades are narrow and convex at their extremities ; the

handles could be separated or fitted on below the lock which was of the French type and secured by a simple screw with a thumb-piece. The width of the blades resembles very much Palfyn's hands. (See Figs. 153 and 188).

1751. De Wind.

Paulus de Wind was a pupil of Dusee's and furnished Mulder with measurements of his teacher's forceps. He designed a vectis. But Mulder in his *Historia Forcipum et Vectium* as well as Kilian in his *Armamentarium Lucinae* figures a forceps designed by De Wind (see Figs. 158 and 194). De Wind seems to have used his curious forceps a great deal, for he changed the length of the blade four times (8, 9, 9¼ and 9½ inches), ultimately adopting the longest measurements 9½ inches. The breadth was in all three-quarters of an inch. It appears to be the smallest forceps ever constructed.

It appears that De Wind thought that the curve in his teacher's forceps was too abrupt and Chapman and Butter were of the same opinion. But Chapman and Giffard adopted a medium curve, as in the Chamberlen's forceps, whilst De Wind went too far, making the curve too wide, yet he seems to have delivered the fœtus *feliciter* somehow.

The following valuable information received by Doran from Prof. Konwer of Utrecht, under date Sept. 24, 1912, throws light on Dusee's relations to De Wind. "In the Mulder collection attached to the University there is no sample of Dusee's forceps. Mulder had never seen it but took his account from Butter and De Wind's writings. Professor Konwer has been good enough to translate all that is said about Dusee in De Wind's work, " 't Gek, emd Hoofd geredt" (The Arrested Head Saved). According to the title page of this work, published in 1751, Paulus De Wind was a lecturer on Anatomy, Surgery and Obstetrics, who practised as a lithotomist and obstetrician in Middelburg, province of Zealand in the United Netherlands."

Translation of De Wind's Observations about Dusee.

"In 1734 when in Paris, I desired, having completed my academical education, to gain some knowledge of midwifery and lithotomy. I therefore went to the renowned obstetrician Gregoire the Younger, and attended with some other foreigners, his lectures, until he was prepared to show us his clinical work. Gregoire demonstrated to us, amongst other instruments, two large long spoons which could be coupled by means of a transverse cross-hook. This instrument he called the *tire-tete* of Palfyn, and taught us that it was of use in extracting living children by the head without injury. It seemed to me very serviceable and worthy of adoption, therefore I was surprised to witness M. Gregoire extracting children with the crochet and sacrificing the living child on more than one occasion, instead of employing this instrument which could save the child.......... I noticed that the *tire-tete* which he had demonstrated to us, was very rusty, from which I concluded that Gregoire himself did not make use of this instrument, though he recommended it to us, doubtless because his own experience of it had been unfavourable.

"Later on, I lived in the house of M. Dusee, another well-known obstetrician, who showed me and my fellow-traveller, Mr. J. Boswell, now a Doctor of Medicine in Edinburgh, another instrument for the same purpose which he declared to us was his own invention. It was the forceps a sample of which was obtained from him by Mr. Alexander Butter and represented in the third volume of Medical Essays of Edinburgh. I never saw him use it, for unfortunately soon after we took up our abode with him he fell ill and died. We saw him, however, deliver a few women. We bought the instrument from his heirs and it fell to the lot of Mr. Boswell but I had another constructed immediately and after returning to Zealand in the Netherlands I soon found by experience that it was unsuited for its purpose. It was far too large and I could not introduce it into the body of my patient."

(Here follow some pages relating De Wind's personal experiences with other forceps and also with his own instrument described and figured above).

"It too often happens that teachers, after they have found that instruments which they have designed on theoretical principles are of no use in practice, cannot desist from demonstrating and expressing approval of them to their pupils........... Thus we see the useless instrument of Dusee described in full in the Scottish transactions above quoted and that of Palfyn in Heister's excellent work."

1751. Burton.

John Burton, was a leading obstetrician in his day and a distinguished antiquary and is immortalized under a pseudonym familiar to all lovers of English prose literature. He was the son of a London merchant and his mother was the daughter of a clergyman named Leake. He was born at Colchester in 1710 and educated at Merchant Taylor's School. In 1733, he took

FIG. 168.—Dr. Burton (Dr. Slop).
(From W. P. Nimmo Hay & Mitchel, Edinburgh).

the degree of M.B. Cantab., having studied in St. John's College. Then he set up in practice at Heath near Wakefield, where he mixed himself up with politics. He married and shortly afterwards went abroad. At Leyden he studied under Boerhaave and the degree of M.D. was conferred on him at Rheims. On his return he settled permanently at York. Burton acquired the nickname "Dr. Slop" early in his career, presumably before

Tristram Shandy was written. Romney, in his pictures of subjects from *Tristram Shandy*, correctly represents Burton where he gives to Dr. Slop, a big head and a short fat body. Burton was long remembered as an odd man, strangely mounted, riding along Yorkshire bridle-roads on the way to assist poor countrywomen. He died on 19th January, 1771. He survived for nearly three years the great writer who immortalized him as "Dr. Slop." Allport has written a short but interesting account of "Tristram Shandy and obstetrics." (See Amer. Jour. of Obs. 1917, vol. 65, p. 612).

The following description of Burton's forceps is taken from his *New System of Midwifry*,* "Postscript," p. 383.

"§6. In §101 and 102, page 211, I showed the Manner of using such forceps as had hitherto been contrived, with the Advantages and Inconveniences that may attend the Use of them both to the Mother and Child, at the same time, I gave Rules how they are to be made, since which time, I have invented a new Sort of Forceps, the use of which is far less prejudicial either to the Woman or Child, and is much more commodious for the Operator. I will therefore first give a Description of the different Parts of the Instrument, with directions how it should be made; and then shall shew the Manner of using it.

Tab. XVIII Explained.

Fig. 1. *Lett. a, a, b, b,* represent two sides or Wings of a Pair of Forceps, being in length, from *a* to the Joint *c* four inches. The Ends, *a, a,* when the forceps is fully extended, are above five Inches distant; and at that time, the widest Part, as at *b, b,* will be about five Inches and one Quarter. When *a, a,* are only extended four inches, *b, b,* will be near four inches, and six tenths. When *a, a,* are three inches distant, *b, b,* will near four inches; and when *a, a,* are but two inches distant (the general Diameter of a Child's Neck) *b, b,* will be three inches and a half; and when *a, a,* are quite close as in fig. 5, *b, b,*

*A comprehensive review of this book will be found in Doran's article on "Burton" ("Dr. Slop"): His forceps and His Foes. Jour. of Obs. and Gyn. Br. Empire, Vol. XXIII, p. 11—16.

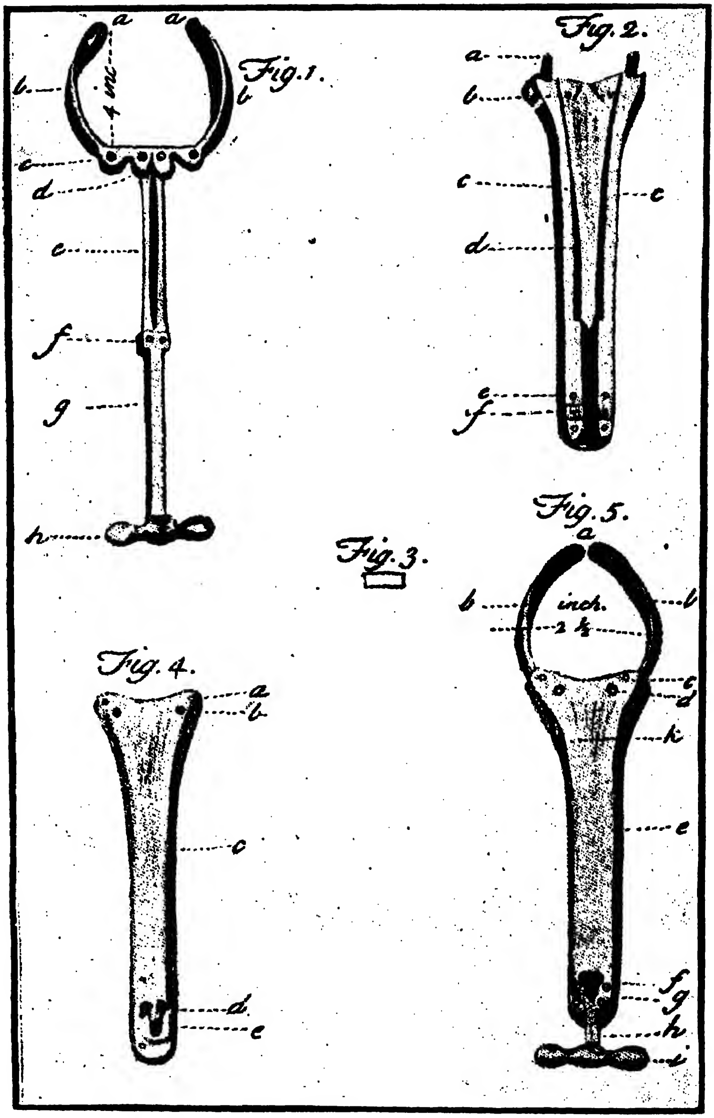


FIG. 169—173. Burton's forceps.
From his New System of Midwifery (Doran).

will be two inches and a half from Outside to Outside. Their Thickness is under two Tenths of an Inch.

Let. *c* shows a Hole in each Wing, in which the Fixed-Pin *a* fig: 2, is to be introduced.

d shews the Pin that fixes the Wings to the lesser Staves, *e;* which are likewise fixed at the other end to the bigger Staff *g*, at *f*: Both the Joints, *d* and *f* are a little movable. The distance betwixt the Hole *c* and the Pin *d* in fig 1, is eight tenths and the distance between the center of the two Holes, *c*, *c*, is one inch and nine tenths.

Let. *h* is the Handle, by which the Instrument may be easily opened or shut, by thrusting up or pulling at it; these Staves may be about four inches in length.

Fig. 2 and 3 represent two flat plates, each about one Eighth of an Inch thick; which, with the two sides, fig. 2 Lett. *c*, *c*, when fixed, form a hollow or cavity for fig. 1 to move in.

a, fig. 2, shews the Pin, which goes through the Hole *c*, *fig.* 1, into the Hole *a*, fig. 4, and appears at *c*, fig 5. This Pin is fixed at one end to the Plate, fig, 2, but is not fixed at the other end. These two Pins serve the Wings to move on.

b, shows the Holes through which the screws are put to fix the plates together, at the upper end of the instrument.

c, *c*, are two pieces rivetted on, to form the Hollow for the Staves to move in.

d, The Backside of the plate,

e, Four Holes for screws to hold the plates together and to fix them, when the great screw *e*, fig. 4. and *g*, fig. 5 is used.

f, is a small Nich, to admit the small plate, *fig.* 3 which is to be forced against the Staff, *g*, fig. 1, by the great screw, *e*, fig. 4 and *g*, fig. 5, to hold the Wings, *a*, *a*, at any distance required.

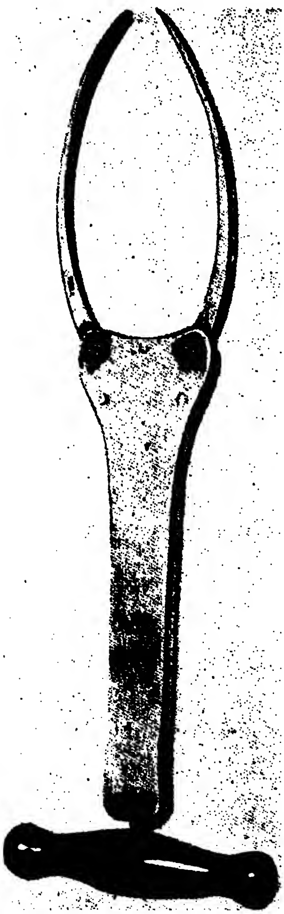
fig. 4 represents a flat plate, to be screw'd on to fig. 2.

e, is a large screw which serves to fix the Wings, fig. *a*, *a*, at any distance required; and also serves the Operator to thrust his Thumb against, as he uses it; as will be shewn presently.

Fig. 5, represents the whole instrument when ready for use. The Breadth of the Head from Outside to Outside of the plate as at *c*, *g*, 5, is two inches and a quarter at *e*, is eight

tenths of an inch, and at *f* is about one inch. The thickness of the whole instrument is about half an inch.

That the instrument-makers may know to what degree the Wings *a*, *b*, fig. *i*, should be bent; I here give them à general Rule to go by—Let them draw an Ellipsis whose longest



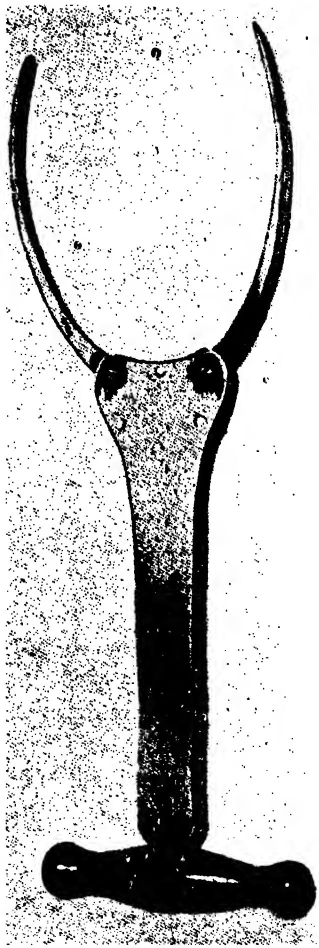


FIG. 174. FIG. 175.
Photographs of a Burton's Forceps in the Obstetrical collection, Museum of the Edinburgh University.
(Doran).

Diameter must be four Inches three Quarters; then let them draw a Line cross each End; where the Diameter shall be just two Inches and a half; and the two Sides of the Ellipsis, between the two Cross-Lines, will be the Length of the Wings; and at the same Time shews the Degree of Curvature necessary for them to be of.

When the Wings, *a, a,* of this Forceps are to be extended without moving the Instrument itself, it is to be performed by putting the Fore-Finger round the great Screw *g,* Fig. 5 and thrusting with the Palm or any other Part of the Hand against the Handle at *i*; when for every tenth Part of an Inch, that the Staff moves, the Wings *a, a,* will be extended, one Inch and a Quarter. On the other Hand, when the Wings *a, a,* are to be brought together again as in Fig. 5, then the Operator may thrust the End of his Thumb against the great Screw *g,* Fig. 5 and pull the Handle, *i,* with his Fingers at the same Time; and if he would fix the Wings *a, a,* at any certain Distance from each other, it is to be done by turning the great Screw *g,* Fig. 5 with the Thumb of the Hand that is without the *Vagina.*

I shall now show the Manner of using this Instrument:—Suppose, then that a Child's Head had passed the *Os Uteri* in its natural Position, but proceeded no further, either from the Mother's Weakness, violent Flooding or that the Head was something too large. In this Case, I introduce a Finger or two of my left Hand into the *Vagina*; and then I take my Forceps in the right Hand with the Wings *a, a,* quite close as in Fig. 5 which End I slide along my left Hand and Fingers which are within the *Vagina,* having the great Screw *g,* Fig. 5 towards my left Hand; so that one Wing will be towards the *Pubis* and the other towards the *Perineum;* Being thus introduced flat along the side of the Child's Head, till the end *a* reaches the Neck or Ear; I then with the right Hand gently expand the Wings *a, a,* in the manner already described; I also slip one of the Wings *a,* edgeways between the *Os Pubis* of the Woman and the Head of the Child, which is done by gently turning the Handle, *i,* with the right Hand, while the Fingers of the left Hand, which are within the *Vagina* assist also, and place the

End, *a,* of one Wing against the Neck of the child below the Ear; when of Course the other Wing must be parallel; I then try with a Finger to prevent anything being betwixt the Wings and the Child's Head; and with my right Hand draw the Wings as near together in the Manner above directed, till I think the Child's Head sufficiently squeezed not to injure it, which I can judge of by the Fingers which are within the *Vagina*; I then fix the great Screw, *g,* Fig. 5 with my Thumb, as above mentioned; by this Means, the Head can be no more compressed neither can the Instrument easily slip off. This being done, I withdraw the left Hand and take hold of the Forceps about *k,* Fig. 5 and assist the right Hand in pulling out the Head, from which, when sufficiently advanced, I, with my right Thumb, loosen the Screw, *g,* and take away the Forceps.

From what has been said, it is evident my Forceps are better than any yet contrived: *First,* because the instrument may be introduced at once, whereby the Operation will be sooner performed. *Secondly,* As the Wings from *a* to *c,* Fig. 1 and 5 are within the *Pelvis,* they can be expanded, more or less without putting the Mother to any Pain. *Thirdly,* The Hand or Fingers, that are within the *Vagina,* will not only move less than when employed in fixing the other sort of Forceps, but also will do it in less Time; both which must occasion less Uneasiness to the Woman. *Fourthly,* As the Joints of these Forceps are within the *Pelvis* the Wings will be applied so as to fit any Child's Head; wherefore the parts of the Woman will be less extended, than with the old Sort of Forceps, And, *Fifthly,* This Instrument is less prejudicial to the Child's Head, because the Wings can be so fixed, at any determinable, Degree of Expansion, as not to compress the Head more, than necessary, whereas, with the other Forceps, the more you pull, the more you squeeze the Child's Head."

Such was Burton's forceps as described by the inventor and as represented by Mulder and Kilian. (See Fig. 156 and Figs. 169—173). It seems a clumsy instrument and may have really damaged the face of some infant* or its breech or

*Tristram Shandy Bk. III, Chap. XXVII.

genitals* or that it actually wounded the hand of some colleague who "presented" his fist, as did good Uncle Toby† to represent the fœtal head, on some occasion when Burton demonstrated the use of his instrument. Possibly the cut thumb‡ or damaged teeth§ of Dr. Slop are allusions to some injury, really received by the obstetrician from the forceps. Then Dr. Slop's remark that "the points of my forceps have not been sufficiently arm'd or the rivet wants closing"** further imply that, as we can understand, the instrument proved a failure.

Sir Alexander Simpson speaks of Burton's forceps as "the ingenious but very unserviceable, forceps working like a lobster's claw." Lowder calls it "a very whimsical contrivance where both blades must be applied at one time—we can not call this an instrument attended with any improvement as they require more room than we expect to have when we use forceps." (Mss. *Lectures* 1782, Library Royal Soc. Med.).

In the obstetrical museum of the University of Edinburgh (Figs. 174, 175) there is an instrument labelled "Burton's forceps." It may be seen that this instrument is the same as described by Burton except that the former is simpler about the lower part. Burton's "big screw *g* fig. 5 and the rivets around it are absent in the Edinburgh sample.

The York Forceps.

The forceps which Burton actually used and which is preserved in the Library of the York Medical Society in York, is not the forceps which goes by his name. The following description appears on the tickets placed in the case which holds the forceps:—

"Midwifery forceps which belonged to Dr. John Burton (1710-1771) the prototype of Dr. Slop in *Tristram Shandy* (*compare Illustrations of Sterne*, John Ferriar, M.D., 1812).

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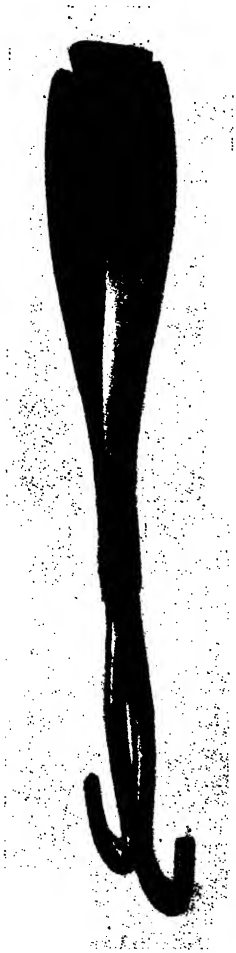
*Tristram Shandy Bk. III, Chap. XVI.
†*Ib*. Chap. XVII.
‡*Ib*. Chap. XVI.
§*Ib*. Chap. X.
***Ib*. Chap. XVI.

"Of all men in the world, Dr. Slop was the fittest for my father's purpose, for his newly-invented forceps was the armour he had proved to be the safest instrument in deliverance."—*Tristram Shandy,* Chap. XIX.



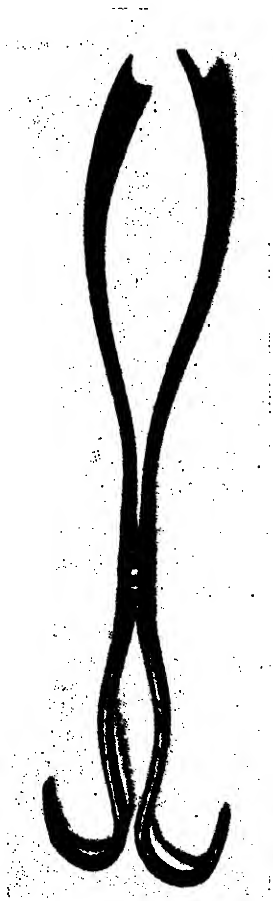


Fig. 176. Fig. 177.

Photographs of Forceps actually used in practice by Dr. Burton and preserved in the Library of the York Medical Society. (Doran).

"These forceps passed from Dr. Burton to his friend Eward Wallis, Surgeon, of York, and descended successively through Mr. Wallis, Jun, Mr. B. Dodsworth and Mr. Ball, who presented them to the York Medical Society."

A further note relates how Burton was the original—"Dr. Slop" "The spectator is invited to believe that these are the identical instruments with which the great Tristram was ushered into the world, but not without detriment to the bridge of his most illustrious nose."

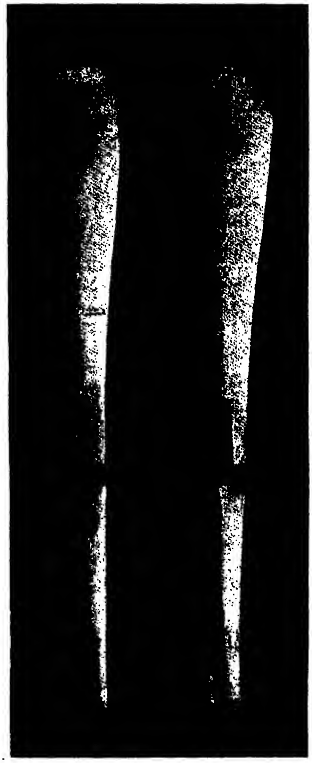


FIG. 178. FIG. 179. FIG. 180.

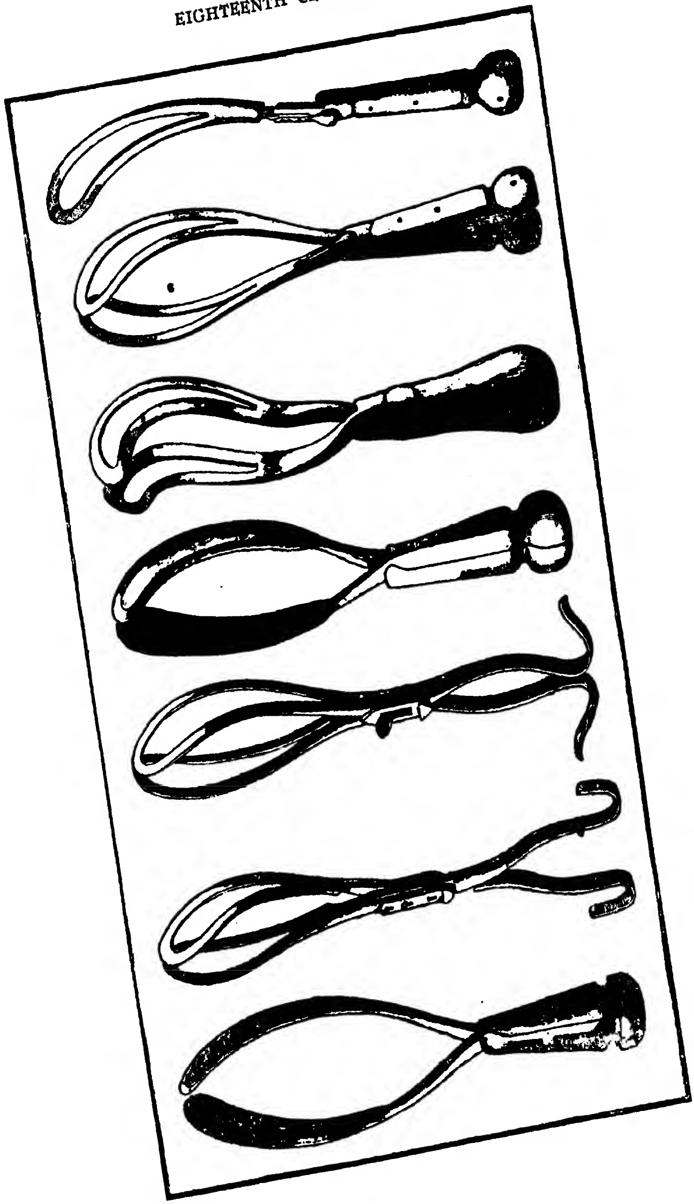
Photographs of Forceps in the Mulder Collection resembling instruments Figs. 176 and 177 used by Dr. Burton. (Doran).

This forceps is quite different from that which Burton describes in his *Essay*. It is in many respects, of the Dusee type.

The York forceps is of about the same length as the Dusee's forceps in the Museum of the College of Surgeons. Each blade and handle are forged in one piece. Each handle is slightly flattened laterally and ends in a hook turning outwards and upwards for about two inches. The handles are not parallel to each other as in Dusee's forceps, but are bowed strongly outwards. We can understand that the parallel handles in Dusee's instrument must have been unsatisfactory. There is only one lock, where a plain screw (without Dusee's thumb-piece) is fixed into a slotted joint to admit of a radial deviation. In this respect, it resembles a modified Gregoire's forceps in the Museum of the Royal College of Surgeons, where indeed the slot is even simpler, being without the two extra, smaller screws which in this forceps are fixed at each extremity of the slot.

In Gregoire's own instrument (as figured by Boehmer) the joint had a much more complicated slide-lock. The blades in the forceps at York cross at the lock, they have no pelvic or perineal curve and the cephalic curve is much less marked than in Dusee's. The blades are not fenestrated and terminate in a broad extremity which bears a concave notch meant to prevent pressure on the temporal vessels. The distance between the extremities of the blades when closed appears about 1 inch (2.5 cm.).

No drawing of a forceps precisely similar to this is to be found in either Mulder or Kilian's Atlases. Doran obtained from Prof. Konwer of Utrecht two photographs of a forceps in the Mulder collection, which is not figured in Mulder's *Historia* (figs. 178—180). It more closely resembles the York forceps than any other similar instrument but the lock is more complicated and the blades non-fenestrated as in the York instrument, are shorter, more curved and apparently not concave at their free extremities. Possibly Burton sent a sample of the York type to his old friends in Holland and this instrument is a subsequent modification or else the York forceps was copied by Burton from a Dutch model.



This York forceps is of the old French type, before Levret introduced the pelvic curve, but with what Levret made out to be the one essential feature introduced by Dusee, namely, the concavity at the broad free end of each blade. Burton probably knew of Dusee's forceps through Butter's paper in the Edinburgh *Medical Essays* to which publication Burton himself contributed.

Thus it is possible, that Burton tried Dusee's forceps and found, as Smellie did, that it was in several respects unsatisfactory. He therefore modified it, and his modification is represented by the instrument preserved at York. Then he devised the forceps which goes by his name, but it proved too complicated, as is hinted at in *Tristram Shandy* and so he fell back on the simpler instrument which ultimately came into his successor's hands and is preserved in York.

Burton's Letter to Smellie:—This remarkable *letter* takes up 233 pages of a small octavo book, printed in fairly large type and published in 1753. Its tone is uncourteous and hypercritical. The most important passages in this spiteful epistle are those wherein the forceps is discussed. Burton strongly denounced Smellie's practice of wrapping leather round the forceps and was truly scientific and practical in his objections to leather. Yet Davis in his "Elements of operative Midwifery," published in London in 1825 describes his asymmetrical forceps "well padded with soft flannel and the whole covered with leather." Probably leather was used down to a much later date than 1825.

The main features of the questions from Smellie's point of view are given in detail in McClintock's edition of Smellie's work.

1752. Smellie.

William Smellie was born most probably in the town or immediate neighbourhood of Lanark some time in the year 1697. He appears to have started as an apothecary in the town of Lanark and in this capacity he began medical and obstetrical practice about the year 1720. He settled in London in 1739. There is some collateral evidence to favour the idea that after leaving Lanark and before taking up a permanent residence in

MULDER. TAB. III.

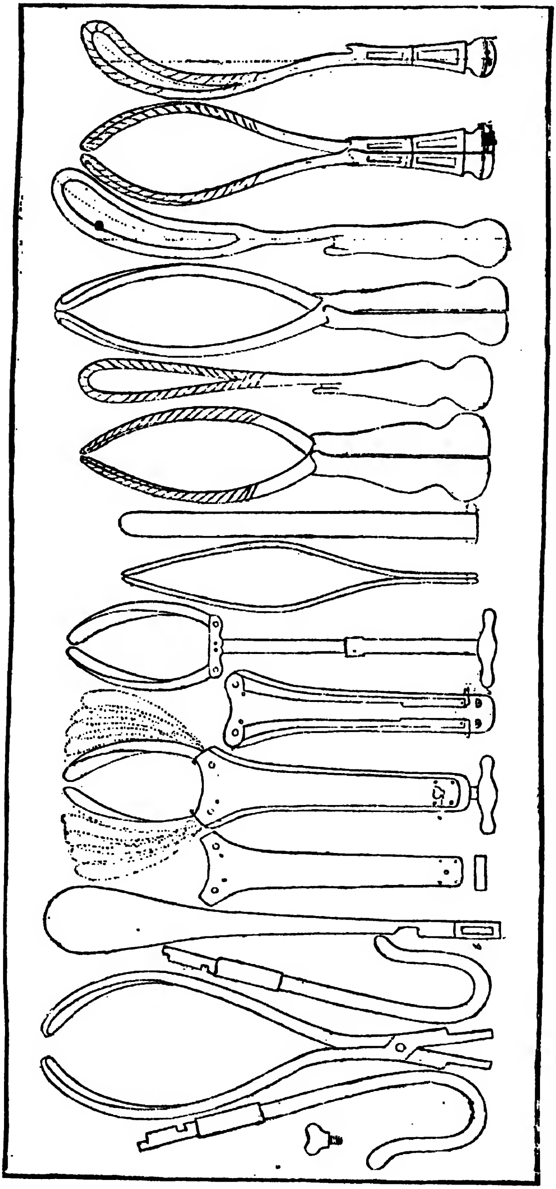


FIG. 188 Bing. 189 190 191 Burton. 192 193 194 De Wind. 195 196 Smellie I. 197 198 Smellie II. 199 200 Pugh. 201

London, he may have spent some months in travelling and attending the obstetric lectures of Gregoire at Paris. He obtained his medical degree some time between 1736 and 1742. He remained at Lanark in the active pursuit of his profession until the year 1739 when he changed his residence to London. Why he ventured to take so bold a step, may be gathered from the observations he makes on case 186. It appears that in the beginning of his practice he knew nothing of the use of the forceps, Chapman's treatise not being then published. Consequently he was often obliged to resort to instruments of a destructive kind to the child and this gave him "great uneasiness" and in order to avoid this "loss of children," he "procured a pair of French forceps' *i.e.*, Dusee's forceps. He afterwards studied the treatises of Chapman and Giffard but not satisfied with that he "actually made a journey to London in order to acquire further information on this subject," but he adds "here I saw nothing was to be learned." Being thus disappointed in London, he next proceeded to Paris (where Gregoire was then lecturing) and made a stay of about three months. There likewise he was "much disappointed in his expectations." It seems more than probable that the cause of his leaving Lanark was the eager pursuit of obstetric knowledge. He selected London as the place of his future residence in order to introduce better and more effectual methods of teaching midwifery.

His success as a teacher was very great and he acquired considerable reputation as an accoucheur. He continued teaching and practising till the middle of 1759 when he retired from active work and returned to his native country, where he took up his residence near the town of Lanark. He employed his leisure hours in methodising and revising his papers and in finishing the collection of cases which form the last volume of his "Midwifery." He only just lived to complete this great work but not long enough to see it all in print. He died on 5th March 1763.

Smellie, in England, systematized the principles of science of midwifery and formulated precise rules for the practice of the art of midwifery as did Levret in France. Two years later

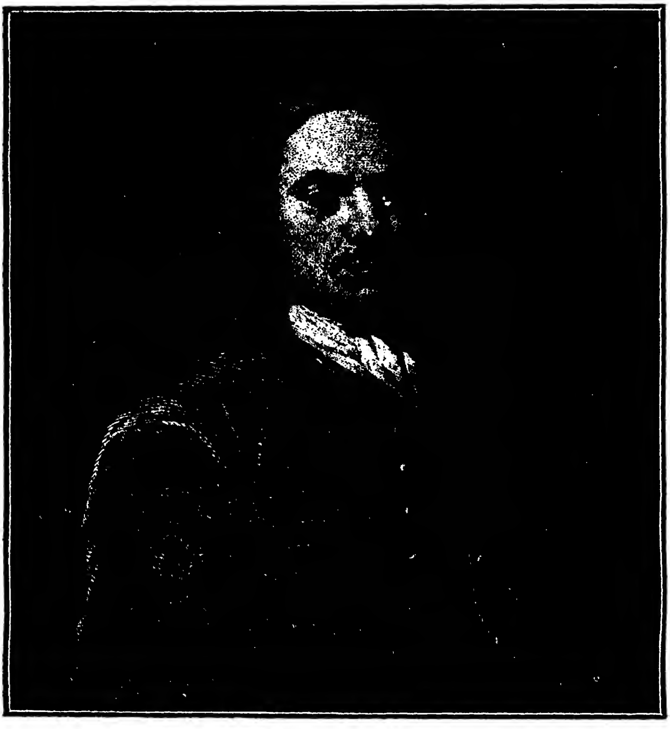


FIG. 202.—William Smellie (1697—1763).

he described the instrument in his book.* The instrument is formed of two steel branches with fenestrated blades and a second (pelvic) curve like that in Levret's forceps. The mode of articulation which is like that in Dusee's forceps, is very ingenious. This is accomplished by a notch in the middle of each branch, fitting into each other. This arrangement is much more convenient than the articulation by means of tablets of half-iron. Smellie recommended the blades of his forceps to be covered by soft leather. The handles of his forceps were made of wood, with a notch in each, so that they could be held together by some sort of a band or strap. In France, Smellie's forceps was mentioned for the first time by Levret in his book,† where he gives due credit to the English Obstetrician for the ingeniousness of the articulation. (See Figs. 184, 196, 199).

The following description of Smellie's forceps is reproduced from New Sydenham Society's Lexicon:—

Smellie, demonstrated to his pupils, a forceps invented by himself, in 1752. Before being curved by the instrument maker, they are 12 inches in length from end of the handle to the end of the blade. When curved, they are 11 inches or a little more, of which the handle measures 5 inches. The widest part of the blade measures $1\frac{5}{8}''$ and this gradually diminishes towards the handle, the blade preserving its flatness to its insertion. The blades have the pelvic curve; the lock is of his device and is the one which is used in English made instrument up to the present day and is known as the English lock; it is formed by a deep square notch in the middle of each blade at the top of the handle, the stem of the blade forming one side of the notch and a steel projection from the handle forming the other. When the branches are crossed and in apposition, the base of the stem of one blade fits into the notch of the other blade and locks the instrument.

To Smellie we owe the best types of the long and short forceps. He considerably modified the form and dimensions of Chapman's forceps and his joint or lock, universally known

*Set of Anatomical Tables with Explanation and an Abridgment of the Practice of Midwifery, London 1754.

†Suite des observations, p. 310.

as "the English" or "Smellie's lock" was in itself a great acquisition and is superior to any other mode of adaptation that has been invented. Besides lengthening the forceps to suit special cases, he added a second or pelvic curve thus producing the long double curved forceps. Whether he or Levret was the first to make this improvement has been disputed, but Smellie was undoubtedly the first British accoucheur to recommend this form of the instrument.

In 1753, in alluding to the employment of a long double-curved forceps, Smellie says "They were contrived some years ago by myself as well as other practitioners, on purpose to take a better hold of the head, when............high up in the pelvis." Levret's treatise describing the double-curved forceps, was published in 1751; but as his name is not mentioned in Smellie's introduction nor in connection with the long forceps we may fairly conclude that Smellie was not aware of Levret's improvements in the instrument. Smellie's treatise was published two years before that of Benjamin Pugh but the latter states that he invented a double-curved forceps fourteen years previously. The credit of adding the pelvic curve has thus been claimed for Levret, for Smellie, and for Pugh.

McClintock's researches* on this point may be summed up thus—That whilst Pugh according to his own representation appears to deserve the credit of priority in the construction and use of the double curved forceps, yet that in the publication of the improvement he was preceded by Levret and by Smellie, both of whom published their respective description of the forceps in the same year (1751). Smellie does not set up any claim for originality in the matter; and neither he nor Pugh appears to have had any knowledge of what Levret had written upon the same subject. It is most probable therefore, that as in the case of many other inventions, the same idea had spontaneously and independently presented itself to different minds and with each of them was truly original. A few years after setting up in London, Smellie made a wooden forceps which he seems to have used on three occasions only, and then discarded. "The design of the wooden contrivance is to make

*Dublin Medical Journal—June, 1876, p. 564.

them appear less terrible to women; besides they are portable and make no clinking noise when used."

Smellie was not exempt from the lot of all reformers and discoverers. His professional reputation and character were freely assailed from various quarters; but he showed himself indifferent to these imputations. In fact a friend and pupil of his own Giles Watts rather complains of Smellie's not having vindicated himself of Burton's charges to which reference has already been made. Watts defended his teacher and censured Burton very severely. William Douglas another virulent assailant of his, wrote letters against Smellie. Amongst other things Douglas charges Smellie with having "a paper lantern, wrote upon, *Midwifery taught here for five Shillings.*" In his answer, Smellie completely vindicates himself from the imputations of mal-practice and unprofessional conduct, but takes no notice of the lantern.

The following descriptions of Smellie's forceps are reproduced from Doran's Descriptive Catalogue:—

Smellie's Short Wooden Forceps.

"Both limbs are cut out of a single piece of box-wood. English lock; handles are very short. There is a palm rest, with the groove for tapes, as seen in most English forceps ever since Smellie's days. The blades have a wide cephalic curve, no pelvic curve, and no shanks. There are no fenestræ, but the wood on the inner side of the blades is widely cut out and grooved, so as to grasp firmly the fœtal head.

"I had before this occasion contrived a particular kind of wooden forceps, with which I had delivered three patients but I now substituted steel covered with leather in the room of wood, which is not so durable." Report of case 269 (no date), Smellie, "Treatise on the Theory and Practice of Midwifery," edited by Dr. McClintock, New Sydenham Soc., 1861, Vol. ii, p. 359. The Editor notes that this is almost the only occasion where Smellie mentions his wooden forceps.

The "English lock" which requires no screw or pivot is seen in this forceps and remains the most popular form of lock amongst Obstetricians in the British Empire. Chapman,

dropping at a labour the screw which he had made for the lock of his forceps found "that the instrument did its office much better without the screw" ("Essay on the improvement of Midwifery" 1733. In the second edition 1735, Chapman figures his forceps with the screw-less "English lock"). McClintock on insufficient grounds considered that Smellie originally devised this lock giving the date as 1744 (notes to Smellie's "Treatise" Vol. i, pp. 21 and 259).

Smellie's Long Forceps with Pelvic Curve.

"Metal limbs completely covered (included fenestræ) with leather. As in the wooden forceps, the blades are slender and broadest near the tips, where they touch when the handles are closed. Palm-rest, no shoulder or finger-rests, shanks not distinct from blades.

In 1737 Smellie then but little experienced in Obstetrics, made use of Dusee's forceps "the French forceps recommended by Mr. Butter" but found it too long and ill-formed and so performed craniotomy and evisceration. He notes that in 1746 he used his own forceps but that at that date its handles "were not altered from crooks to wooden handles," He set no value on his wooden forceps and used for many years exclusively a forceps shorter and smaller than Chapman's, Giffard's or Pugh's (Smellie and McClintock, *loc cit* No. 3). In 1752 in endeavouring to deliver the after-coming head in a breech case, the short straight forceps proved a failure, "this was the reason which prompted me to contrive a longer kind the blades of which are curved" (*loc cit*, vol. iii, p. 23). In 1753 Smellie had to deal with an arm presentation. The foot was brought down. As the funis still pulsated he resolved to try his long curved forceps and succeeded in saving the child. McClintock states that Smellie apparently restricted the use of his long forceps for cases where instrumental delivery of the after-coming head was necessary and for cases of face presentations where the chin lay towards the sacrum.

Pugh seems to have employed a forceps with the pelvic curve about 14 years before Smellie's curved forceps was first constructed (see Aveling, "The Curves of Midwifery forceps—

their Origin and Uses" *Trans Obs. Soc.* Vol. xx, p. 130). Levret figured his *forceps courbe* in his "observations sur les causes et les accidens de plusieurs, accouchemens laborieux" First Edition 1747.

The critical observations of Pinard,* regarding the evolution of forceps may, appropriately be quoted here. After making a few general observations as to how the forceps may possibly have been evolved from the primary idea of replacing the human hands by some sort of an easily applicable appliance he goes on to say "but the instruments of Chamberlen and Palfyn possessed only a restricted field of application and was not always without danger to the maternal organs. In fact, those forceps although composed of two branches introduced successively and articulated thereafter and possessed the cephalic curve, were helpless in seizing the head, still lying high. The straight branches could not be introduced deep into the curved canal represented by the pelvic axis. This is what Smellie and Levret realised soon. In imprinting the same modification to the forceps, at intervals of several years, they were perhaps not guided by the same idea.

In giving the forceps the pelvic or the "grande" curve, Levret's main idea was to avoid injury to the perineum. But it was, by no means, his only thought, as the following quotation† shows . "It is not however the only aim I had before me, as all the good practitioners admit at the present day, the little effect of the straight ordinary forceps on the head impacted in the passage, and lying high up. The new form which I have given to the forceps is very useful, since by means of the pelvic curve it catches the head quite efficiently." Thus Levret recommends his instrument when the head of the fœtus is already engaged across the external orifice, but he forbids its employment when the child remains completely inside the uterus. "Some intelligent persons attribute to me the opinion that I advocate the use of curved forceps, when the head is still inside

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*Dictionairre Encyclopedique des Sciences Medicales (Fourth series, third volume, p. 525).

†Observations sur les causes et les accidens de plusieurs accouchements laborieux 4th Edition 1770, p. 105.,

the uterus and has not yet engaged in the orifice. I do not however, advise the use of it, in such cases in which the other forceps may be used. The curved forceps has essential points of advantage which will be known by experience and will dissipate the prejudice one would perhaps have on this subject."*

Smellie,† on the other hand, says that he has had his forceps curved, in order to seize the head not yet engaged. "In a narrow pelvis"•says he "I have sometimes found the head of the child thrown so much forward over the os pubis by the jetting in of the sacrum and lower vertebra of the loins, that I could not push the handles of the forceps far enough back, to include within the blades, the bulky part of the head which lay over the pubes. To remedy this inconvenience, I contrived a long pair curved on one side and convex on the other: but these ought never to be used except when the head is small." Since this memorable epoch, the forceps possessing one curve in favour of the mother and another curve in favour of the child, was universally used, in spite of modifications, so numerous, so varied and often so useless, which so many accoucheurs have subjected to, that M. Tarnier was quite justified in saying in his article‡ on forceps that the Levret type of forceps was found in the hands of all the accoucheurs of the time when he wrote the article.

In fact, what Levret and Smellie had in view, in modifying the forceps, was the form of the fœtal head to which it was to be applied and the curvature of the pelvis in which it was to be introduced.

No doubt the instrument was made lighter and consequently easier to handle, the mode of articulation, since Heister, was greatly modified, to arrive at that of Thenance, Brunninghausen, Siebold and Simpson, the handles took various forms, the blades became more or less curved on the flat or at the edges but up till lately, the principle on which the construction of Levret's forceps depended remained unshaken. Whatever, Schroeder may say, German accoucheurs have not brought about very

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*Levret. Observations, 1770, p. 168.

†A Treatise on the theory and practice of Midwifery by W. Smellie. Third Edition, 1756, Vol. I, p. 260.

‡See, Dectionaire de Medicine et de Chirurgie, pratique.

important improvements of forceps; some of them have disfigured it others have given it a more graceful appearance but after all Naegele's forceps are only those of Levret's, and it is also the same as those of Siebold, Simpson and Stoltz.

Of late, the study of the mechanism of labour has been more complete and the exact knowledge of the movements executed by the fœtal head in its passage through the pelvis has been more perfect. Some accoucheurs, therefore, investigated, if by means of Levret's forceps, it was possible to give artificially to the fœtal head, the movements which it executes in spontaneous delivery and if it was possible to extract it along the axis of all the planes of the pelvic canal.

These controversial questions of grave importance, once raised were soon discussed and studied. Some important points were or seemed to have been definitely settled or scientifically proved while others required new research, as may be seen when the mode of action of the forceps is dealt with. It is there that we shall set forth the opinions and researches of Johnson, Herman, Hubert, Morales and Tarnier.

As obstetric auscultation has rendered the indications for the application of forceps more frequent and more precise and as the knowledge of intimate phenomena of delivery has been progressing continuously, the inevitable result was the modification of the instrument. Attempting to replace nature, where it fails and to approach nature as much as possible, the accoucheurs will only reach perfection, if ever they succeed in doing so, when the mechanism of labour will be completely understood. Till then each step of progress, recorded and added, will entail modifications, more or less important affecting the method of operation as well as, the instrument.

This shows that no man, even when provided with the best forceps, will be able to employ them usefully unless he has, in the first instance, studied the natural phenomena of delivery."

Pinard then gives the following *general Description of Forceps.*

"The instrument is composed of two branches, each branch presenting for consideration, the blade, the articulation and the handle. Of the two branches, one is called the male, the pivot,

or the left branch and the other the female, the mortise or the right branch. Now that the obstetrical language is becoming more scientific, it would be desirable, not to use these multiple names, of which some have so useful significance. So, we shall call, after Professor Pajot, the branch, which has to be introduced to the left side of the pelvis, the *left branch*, and that which has to be introduced on the right, the *right branch*.

In this way, these terms, will always remind one of some fundamental rules, which will never change, although the pivot and the mortise may be found on one or the other branch or they may not exist at all, as in the case of forceps with parallel branches.

In order to give a clear and essential idea from a practical point of view, Madame Lachapelle proposed to name the branches of the forceps, right and left according to the position of the blades in the hands of the accoucheur. The male branch represents the right hand of the accoucheur and so it should be called the right branch, the female represents the left hand and is therefore the left branch ; thus for her, our left branch was right and our right branch left.

Fortunately these terms did not at all prevail and Prof. Pajot has succeeded in impressing several rules in the minds of his pupils, by the following short sentence : Left branch held by the left hand and introduced to the left, everything must be left except the accoucheur.

The blade is only meant to be introduced into the maternal parts, to catch the head of the child. The blade is wide and flattened, and has two surfaces, the convex, corresponding with the concavity of the side of the pelvic cavity and the internal concave, corresponding with the convexity of the fœtal head. Each blade has an opening in the middle, called "fenestrum" which makes the instrument lighter and consequently easier to handle and which also by allowing the parietal protuberances to fit into it, enables the head to be properly held.

Lastly, since Levret, the blade presents a curve at the edge which is called the pelvic curve, in contra-distinction to the curve along the surface and which is known as the cephalic curve.

It will be seen that while the form of the blades varies but little in the forceps of principal authors, the mode of articulation and the form of handles, differ considerably.

The forceps generally used in France (in 1879) is no other than that of Levret slightly modified. By the substitution of steel for iron, in the manufacture of forceps the instrument has been made thinner lighter and more graceful in appearance. The instruments of different manufacturers vary to a certain extent, in their length, in their pelvic and cephalic curve, and in the width of the blades, but in all, the average total length is 45 c.m., the distance from the pivot to the tip of the blades being 24 c.m. and that from the pivot to extremity of the handle, 21 c.m. When this instrument is placed flat on the table the perpendicular distance to the tip of the blade is 8 c.m. The widest portion of the blade is at a point about 4 c.m. from its tip and measures 5 cm. The width of the fenestrum is 3 c.m. When the instrument is articulated, the distance between the tips of the blades is 1 c.m., the greatest distance between the branches is 7 c.m. The weight of the instrument is about 800 grammes. The articulation is no longer that of Levret *i.e.*, represented by a central mortise and a pivot, but that of Siebold. The mortise instead of being pierced at the middle of the female branch, is scooped out at the side and the articulation is no longer made by lifting the female branch to make the pivot enter the mortise but simply by bringing together the two branches, until the pivot enters the indented mortise, where one fixes it by moving it downwards as a screw goes into a nut.

The iron handles are curved at their ends in the form of a blunt hook. One of them carries at its extremity a removable hollow olive which envelopes a sharp crotchet. The other handle may be disjointed at its middle ; leaving in view a sharp point, which may be used as a cranial perforator. In short this single instrument, is a combination of the forceps, the blunt hook, the sharp crotchet and the perforator.

Pajot considers the latter three modifications as useless and condemns them by saying that "these things exist to warn you that you must never use them." For a few years past

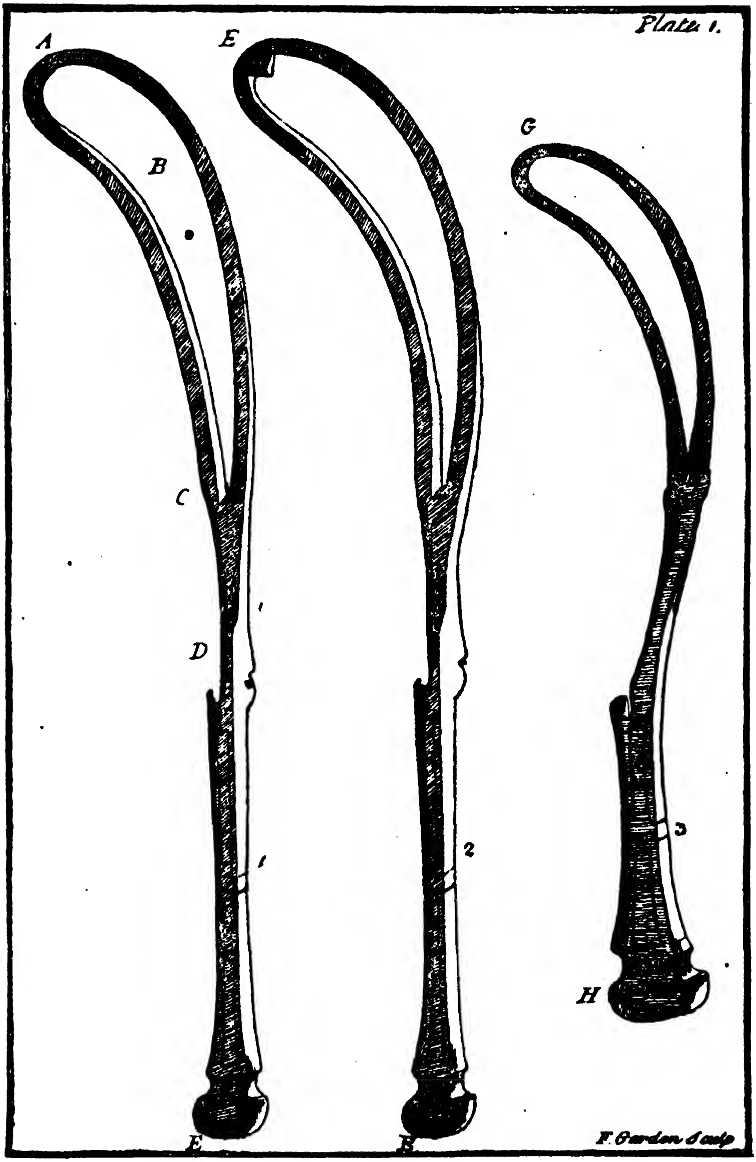


FIG. 203. FIG. 204. FIG. 205.
Pugh's Forceps.
(From his Treatise of Midwifery, 1754).

Mathieu has been manufacturing some forceps, according to our directions, with perfectly simple handles with curved ends but without any hollow olive or screw of any sort."

1754. Pugh.

Benjamin Pugh, Surgeon at Chelmsford in Essex describes his forceps which, he says, he used with success "for these fourteen years past"............"The Curved Forceps, I invented upwards of fourteen years ago made me by a Man of Mr. Archers Cutler now living in *Chelmsford.* The Preference between them and the common Straight Forceps, in every Respect is great."

The instrument (See Figs. 181, 200,201, 203-5) resembles so much, those of Levret or of Smellie, that one wonders if Pugh is really an inventor or that he got his idea from a sample obtained through his pupil. (See McClintock).

Description of Pugh's Forceps from his "Treatise of Midwifery" London 1754 with plates.

PLATE 1.

"1. A. B. C. D. E. my large Curve Forceps; the Length from A. to E. is fourteen Inches; the Breadth of the Bow from Outside to Outside, in the widest Part, which is near the Top, is one Inch and three Quarters.

A String being strained from A. to C. at B. which is near the Middle of the Bow, ought to be one Inch and a Half from the String to the outside Edge of the Bow (which shews the concave Part, or proper Curve inwards;) and a String strained from C. to *a*. upon the upward Edge of the Bow at B. should be three Quarters of an Inch, which shews the proper Side Curve, or upwards; which adapts them to the make of the Passage and shews the great Preference between them and the Common Straight Forceps, both in introducing and extracting.

2 F. A Forceps of the same dimensions, with a small Crotchet fixed at the Top of the Bow, which I should prefer to the common Crotchets (though I have never made use of them).

3 G. A small forceps, from G. to H. eleven Inches, made in Proportion to the long ones, to be used when the Head lies low in the Passage.

MULD] TAB.

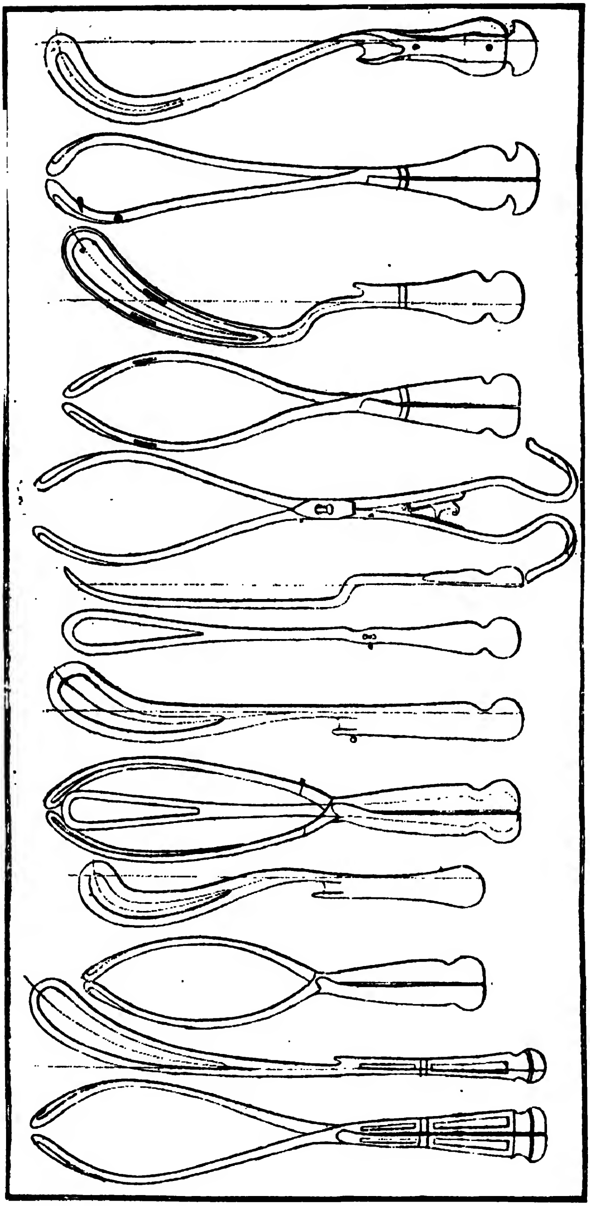


FIG. 206. 209. 1. 2.
Pugh I ohnson. L ke Va S

1754. Mittelhauser.

John Daniel Mittelhauser describes[1] a toothed forceps which resembles Heister's. (See Heister, Taf. III, Fig. 4).

1767. Stein.

Stein of Cassel* prolonged the fenestræ of his long forceps towards the lock, that he might pass through this space a band of pliable material to enable him to make more advantageous traction—thus fore-shadowing axis-traction forceps.

Stein† used the forceps for compression and introduced the so-called *Labimeter,* for measuring the amount of compression and also to know the distance between the blades, and the measurement of the head.

1769. Johnson.

Robert Wallace Johnson,‡ described with illustration a forceps of his own invention. Having been a pupil of Smellie he observed that after Smellie introduced the first branch of the forceps, it used to slip in to the hollow of the pelvis and the branch could not be replaced into position. In order to obviate this serious inconvenience, Johnson not only gave the fenestrated blades, the pelvic curve but added another curve in the opposite direction. Moreover, he flattened, as Levret had done, the edges of the fenestration which Smellie had rounded off ; but he flattened them without scooping out. The mode of articulation is that of Smellie—the notch is only deeper. Johnson covered the whole of his instrument with Russian leather. (See Figs. 185, 208 and 209).

1770. Fried.

In one of the early models of Levret's forceps it may be observed that the articulation could be done at three different heights. This seems to indicate that Levret felt the necessity

[1] Praktische Abhandlung vom Accouchiren. Leipzig, 1754, S. 36.
*B. M. J. Dec. 5, 1908.
†Ingerslev. p. 66.
‡New System of Midwifery, London; 1769.

KILIAN'S ARMAMENTARIUM. TAB. XVII.

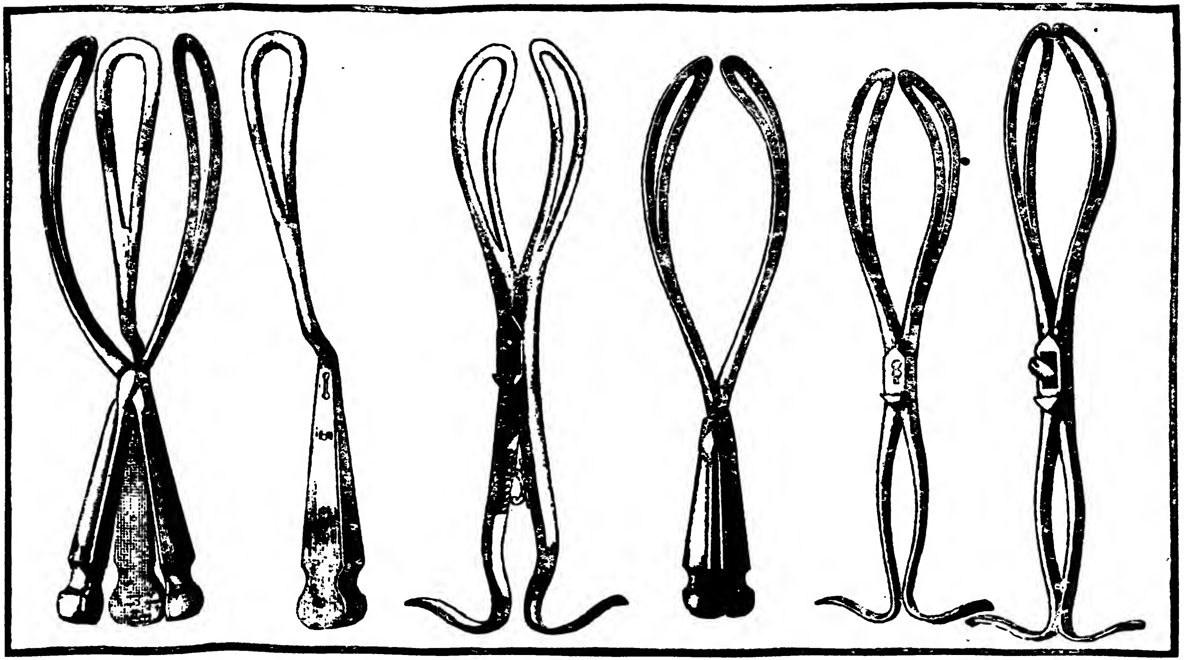


FIG. 219. Leake. 220. 221. J. L. Petit. 222. v:d. Laar. 223. Coutouly. 224. Pean-Baudelcque.

of being able to articulate his forceps without having given an absolutely symmetrical position of the branches. It appears however that Levret's idea of asymmetrical application of the branches, had not been taken notice of. It may thus be assumed that G. A. Fried of Strassburg was the real introducer of the asymmetric forceps. Rist* quotes in his thesis three modifications that Fried brought forward and the following passage occurs: "He places his forceps, so that one of the handles can turn on its axis by means of a screw so that this blade can take triple direction." Asymmetry was thus created. (See Figs. 186 and 187).

1771. Piet.

Piet has modified Levret's forceps by giving to it a different curvature which however was of no practical utility. (*Vide* Journal de Medicine, Pharmacie et Chirurgie Tom. XVI, XXXVI and XXXVII, Saxtorph im angef. Buche. S. 89: also Kilian's "Operative Geburtshulfe") In Busch and Mosher's Handbuch der Geburtskunde, the date is put down as 1779(?). No diagram is available.

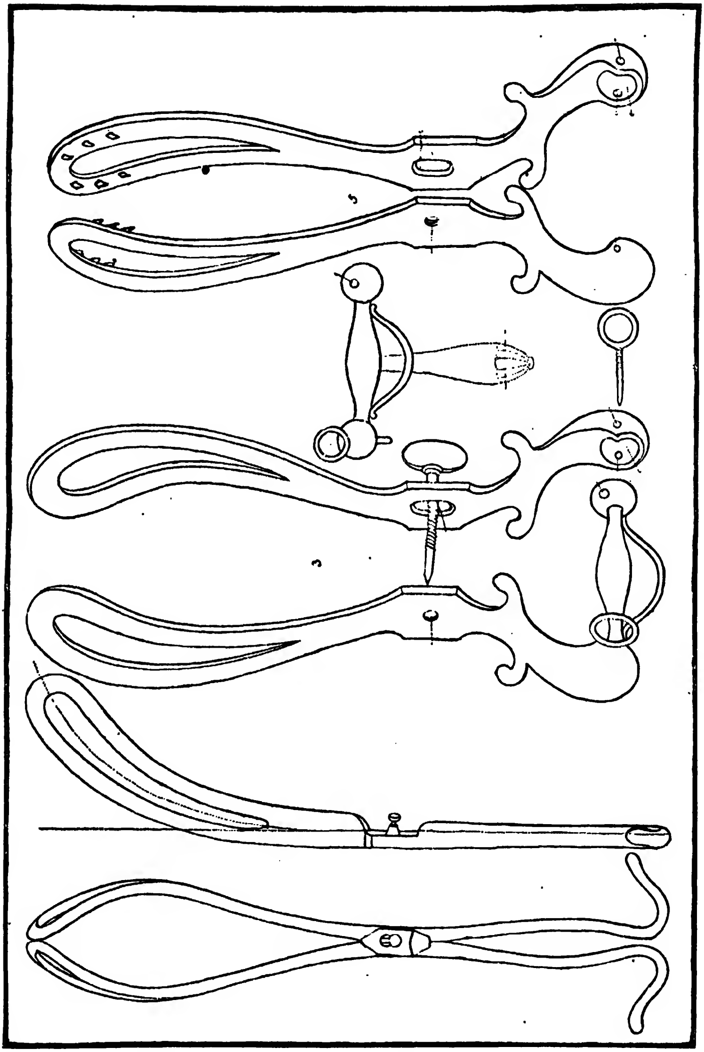
1774. Leake and J. L. Petit.

John Leake, M.D., was born on June 8, 1729 at Ainstable in Cumberland. He was a Doctor of Medicine of Rheims. He extended his professional views by visits to Lisbon and several parts of Italy. He died at his house in Parliament Street, August 8, 1792.

John Leake was a voluminous and successful writer and was a popular lecturer at his theatre in Craven Street. He founded the New Westminster Lying-in-Hospital in 1765 and was appointed its first physician. No one but an anonymous "late pupil" seems to have had a good word for his three-bladed forceps. Lowder speaks of Leake's forceps thus:—"Formerly there was a society of gentlemen of our profession who used to meet once a month for the purpose of consulting on midwifery, and I remember that one evening was entirely taken up in

*Essai historique et critique sur le forceps. These de Strassbourg decembre 1818.

TAB. X.



DER

treating of Dr. Leake's forceps. At this time there was almost every practitioner in town present but Dr. Leake, and there was not one gentleman that spoke in favour of them."

John Leake suggested* a forceps with three branches. In fact he combined the ordinary forceps with a lever. The blades, whether of the forceps properly so-called or of the lever are fenestrated and have the same curvature as those of Levret. They are flattened at the edges. The mode of articulation is analogous to that adopted by Chapman and Smellie.

It was in the same year that Jean Louis Petit made known his forceps† which does not differ from that of Gregoire, except for a kind of sharp claw, which could be moved up and down placed inside one of the handles. This claw can get fixed in the notches of a toothed rack adapted to the other handle. This little mechanism served the purpose of regulating, at will, the compression of the fœtal head by the forceps during extraction. (See Figs. 210—213, 219 and 220. Also Figs. 214 and 221).

1776. Henckel.

Henckel's forceps is mentioned in Kilian's "Operative Geburtshulfe" and Busch and Mosher's Handbuch der Geburtskunde." No description or diagram is available.

1777. Van de Laar.

Arnold Van de Laar's forceps has fenestrated blades with Levret's curvature and a second curvature, almost a right angle, placed near the articulation which is after Smellie's model. An oblong aperture is pierced through the margins of the fenestrations, so that in case of necessity tapes or threads may be passed through. (See Figs 215, 216, 222, 269—272).

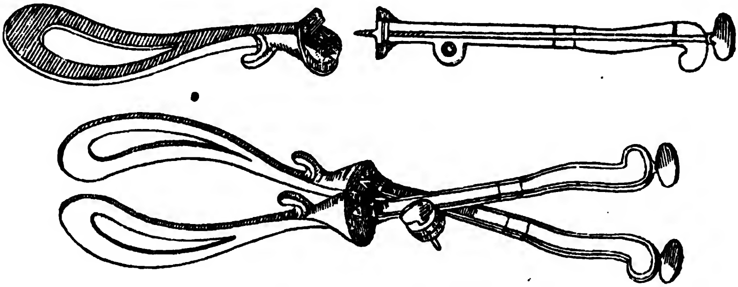
1777. Coutouly.

In the year 1777, a case of difficult labour was described in which *Coutouly* Junior employed successfully a forceps

*Lecture introductory to the Theory and Practice of Midwifery Lond. 1774 in 8° Also 1782.

†J. F. L. Petit edit. de Lesne.

modified by him. (Fig. 223 and 226). Later Coutouly devised another modified forceps, in which the handles were brought together side by side, without inter-crossing, by means of a large screw. These handles present at their extremities a cross-piece



FIGS. 230 AND 231.
Coutouly's "forceps brise." (Witkowski).

on wood, which allows the accoucheur to apply the necessary force of extraction. (Fig. 227-8 and 236-7). In one of the forceps the blades are spread out, about the fenestrations, owing to which it could be used in case of dead children only. (Fig. 229). Coutouly's forceps brise is illustrated in Witkowski's Arsenal obstetrical (Fig. 230, 231). See also page 230.

1781. Foster.

Edward Foster, Teacher of Midwifery and Obstetrician in the city of Dublin gave a description of his forceps in his book "The Principles and Practice of Midwifery, completed and corrected by Jam. Sims, M.D., London, 1781.

The blade is fenestrated, single curved and is covered with soft and thin leather. It is 6 to 6½ inches long. The breadth of the fenestrum, from the middle point to the tip is 1 inch, whereas at the commencement of the blade it is half an inch. The length of the handle is 4 to 4½ inches. At its lower end there is a sort of cross-bar (or pressure regulator) by which undue pressure on the head may be prevented. No diagram is available. Schlegel in his translation of Mulder's Historia, mentions in the appendix about this forceps but the name is evidently misspelt as "Forster."

Busch and Moser in their Handbuch der Geburtskunde give the date as 1788.

1781. Pean.

To Baudelocque we owe our knowledge of Pean's forceps. This forceps is longer than that of Levret by 3 cm. The articulation is the same as that of Levret. (See Figs. 164, 165 and 224).

1781. Baudelocque.

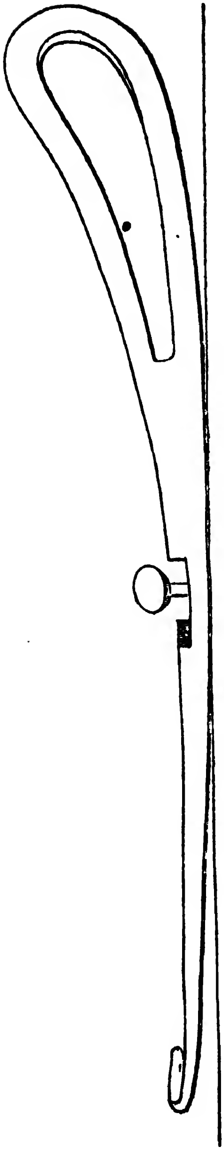
Jean Louis Baudelocque was born in Picardie in the year 1746. He studied medicine in Paris, paying special attention to Anatomy, Surgery and Midwifery. He was Solayre's pupil and after the death of the latter he became "Surgeon-in-Chief and Accoucheur" of the newly established maternity (1798). He had a great reputation as a Practitioner and was appointed accoucheur to Napolean's wife. He died on 1st May, 1810.

Baudelocque's forceps was practically the same as Levret's except that it is about two inches longer and is destitute of the obtuse ridge or crest on the internal face of the blades.

Dewees in his book "An abridgment of Mr. Heath's Translation of Baudelocque's Midwifery" published in Philadelphia in 1823, gives a diagram of Baudelocque's forceps with the following description of the instrument.

"To Instrument Makers.—The forceps delineated in plate VII* are reduced to a third of the size of the original. They differ a little from these expressly mentioned in this work: 1st. In not having the thread running round the edges of the internal face of the forceps, 2nd. In having the internal edges of the openings in the blades made nearly as thin as the external or superior and inferior edges, by which means more room is allowed for the head to accommodate itself when seized by the instrument. This is considered as a great improvement; for in the common way of making these instruments, the blades are pierced in the middle, where they are of considerable thickness, and this thickness is allowed to remain, and consequently diminishes the space between the blades when fixed. Now by

*Plate VII, is reproduced in Fig. 232 and 233.



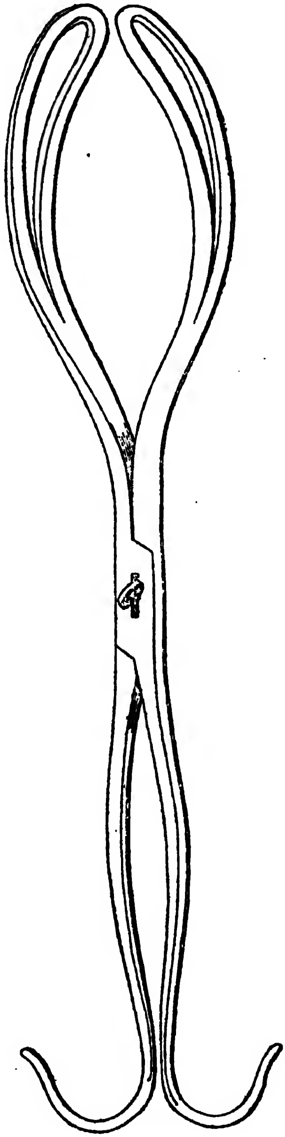


FIG. 232. FIG. 233.

Baudelocque's forceps (from Dewee's book).

taking down these edges, and making them nearly as thin as the external or superior and inferior edges, much room is gained. 3rdly. The slide at the top of the female branch, which is intended to secure the pivot of the male branch, is omitted as useless.

1781. Thenance.

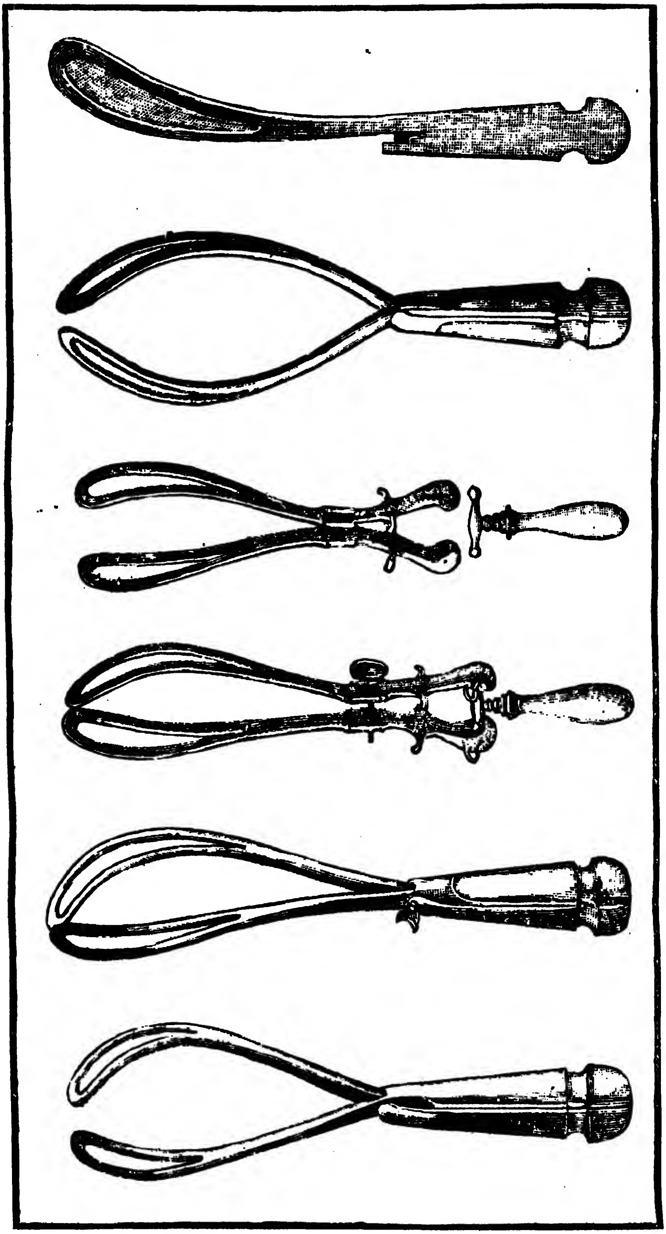
To Jean Simon Thenance, a Member of the College of Surgeons of Lyon, belongs the credit of describing and introducing the parallel forceps. The branches are parellel and articulate by means of a hinge at the extremity of the handles. They are perforated at the middle by an opening into which a noose passes intended to complete the articulation and fix the instrument.

Thenance's work* came out in 1781. The following description of Thenance's forceps is taken from Rolland's† thesis, which is based on an original copy of Thenance's memoir. "My forceps or rather my modification of Levret's celebrated instrument are longer than any I know of. The blades are wider and enable the head to be grasped more firmly. The space between the blades is less than in Levret's forceps. From their middle portion, where the blades are widest apart, they very gradually come close together at their lower portion. The result is a gradual dilatation of the Vagina and Vulva, when the head passes through the soft parts of the mother. *The chief distinguishing feature of my forceps is that its branches are not crossed.*

This difference gives a simplicity to the instrument which was wanting in Levret's and favours the introduction of the branches. The celebrated Levret, the Hippocrates of Obstetricians, who believed he had brought the forceps to the highest

*Nouveau forceps non-croise ou Forceps du Celebre Levret perfectionne en 1781, avec la maniere de s'en servir, Par *Jean—Simon* THENANCE, Docteur Medicin et Member du ci-devant College de Chirurgie de Lyon. "Si non errasset fecerat ille minus "MARTIAL." A Lyon de l'imprimerie de balanche et barret Aux halles de lagrentete, Brumaire. An X.

†Du Forceps Lyonnais ou Forceps a Branches Parlleles par Le Dr. Maurice Rolland, Ancien Externe des Hopitaux de Lyon. Lyon, A. Rey Imprimeur-Editeur de L' Universite 4 Rue Gentil 1905.



KILIAN ARMAMENTAR. TAB. XIX.

degree of perfection used to say that his instrument was still wanting in something. He had remarked that the difficulties one meets with in certain cases, rendered the locking of the branches almost impossible to the cleverest obstetrician. These

Fig. 240 (2/5 actual size).
Represents the internal face of the right branch of the forceps.

1. Length of the branches 18 inches or 480 mm.

2. Length of the blades from tip to the aperture, meant to pass the corner of a napkin, 8 inches, 6 lines, (230 mm.).

3. Length of the fenestra of blades 5 inches, 11 lines, (160 mm.).

4. Length of aperture meant to have a corner of the napkin 1 inch, 1 line (29 mm.).

5. From the extremity of the crochet, to the branch opposite the pin, 2 inches, 8 lines, (72 mm.).

6. Width taken at a distance of 12 lines, below the superior extremity of the blade, 2 inches, (54 mm.).

7. Width of the middle part 1 inch, 7 lines, (43 mm.).

8. Width of the lower part, 11 lines, (20 mm.).

9. Width of the fenestrated aperture of the blade, taken at a distance of 8 lines, below its superior internal border 1 inch (27 mm.).

10. Width at the middle part, 7 lines (16 mm.).

11. Width of the lower part, 3 lines, (7 mm.).

12. Width of branches which form the circumferences of the blades in the middle part, 6 lines, (14 mm.).

13. Width of the superior extremity of the rounded portion 7 lines, (16 mm.).

14. Width of the fenestrated opening where the angle of the napkin passes, 3 lines, (7 mm.).

N.B.—In this part, the width and the thickness are just a little more marked, so as to maintain the same degree of strength, as in the neighbouring parts of this aperture.

15. Width of the internal fenestrated border of the blades which diminishes on the external, aspect and is rounded off so as to maintain it to the opposite border of the rim, 2 lines, (6 mm.).

16 Height of the rim ⅔ of a line or (1½ mm.).

Joint—At the lower extremities of the branches of the forceps, there is a joint, composed of, one of them, of two ports, and the other of one only: flattened, rounded off in their circumference. Each of these is pierced with a hole to receive the pin.

17. Projection of this pin including a line taken up by the thickness of the branches of the forceps, 7 lines, (16 mm.).

Fig. 241. Represents the complete forceps, the two branches being placed in juxta-position.

18. Distance between the tips of the forceps 9 lines, (20 mm.).

19. Distance between the blades, with the pin at the joint fixed, at the superior portion of the fenestrum, 1 inch, 3 lines, (34 mm.).

20. Distance in the middle part, 2 inch, 5 lines (65 mm.).

21. Distance in the lower part, 11 lines, (26 mm.).

22. Transverse distance between the handles of the forceps, 1 inch, (27 mm.).

23. Longitudinal distance between the handles, 5 inches, (135 mm.). The pin is hung on to the crochet by a string.

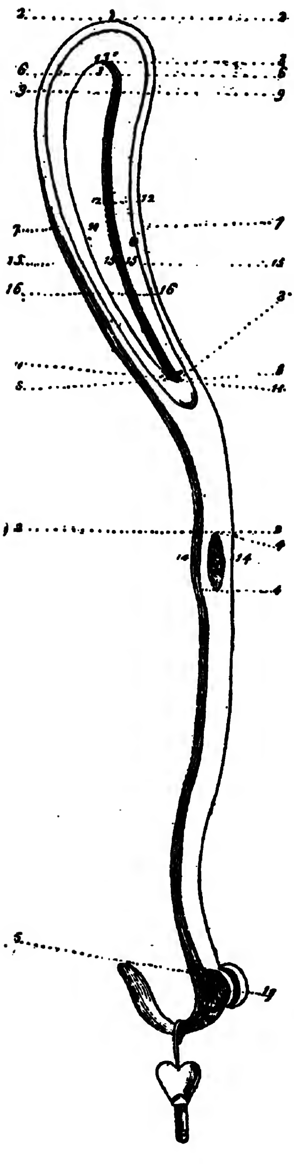


FIG. 240.

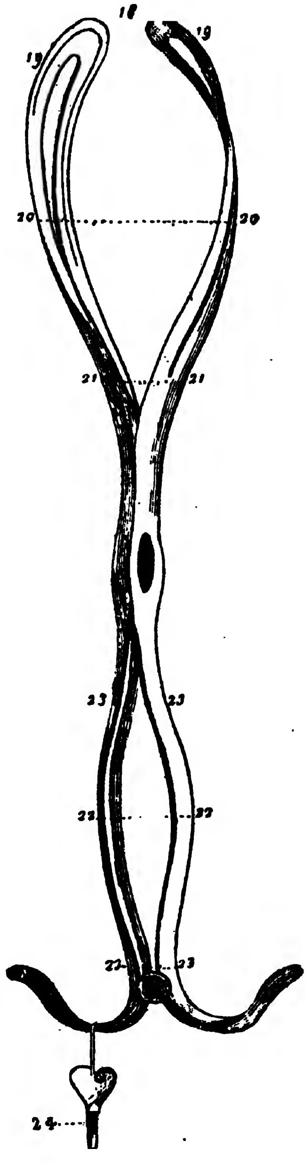


FIG. 241.

Thenance's forceps.

difficulties led me to think as to how the articulation of the branches could be effected in some other part of the instrument so that the forceps could be locked in the most difficult cases. The result has been the construction of my parallel forceps."

Three models of Thenance's forceps, manufactured by Taboureux of Rue, Saint Cimon, are to be found at the Clinical Museum of Lyon.

Its length is 47 cm. and its weight 1215 grammes.

Poullet, in his thesis, says "the instrument of Thenance with its collosal dimensions is just an instrument of curiosity in the show-cases of our museums."

The "Lyon forceps", as it is called, fulfils a condition very much desirable in many cases, *viz.*, the juxtaposition of the branches without intercrossing or notches, at the usual point of intersection. At that point, there is an opening sufficiently large, through both the branches, which are intended for the introduction of the corner of a napkin, by means of which one can clese together the two branches, as much as may be desired. With the rest of the napkin one can wrap up the lower part of the handles of the instrument, down to the crochets. The corner of the napkin opposite to that used to tie the blades, can be left to extend beyond the crochets, and may thus help the action of an additional aid in case of necessity. The real metallic junction of the branches is placed at the lower end where the curve of the hooks begins and is formed of two small hinges, fitting one another and kept fixed by a key. Moreover Thenance made his instrument longer than that of Levret ; the blades are more extended in every direction. The transverse axis between the curves of the blades is rather smaller than that of Levret's forceps. (See Figs. 240—243 and 316).

The forceps of Assilini, Martin (Jun), Lazerewitch and Valette are constructed on the same principles.

1782. Orme-Lowder.

David Orme, M.D. was a native of Scotland and Doctor of Medicine of Edinburgh. He held the office of man-midwife extraordinary to the City of London Lying-in Hospital and died

Fig. 242. Thenance's forceps supposed to be applied on the fœtal head; the lower part of the branches are wrapped round with a napkin.

Fig. 243.
Outer aspect of the left branch of Thenance's forceps.

at Lamienby, in the parish of Bexley, Kent, on April 4, 1812, in his eighty-fifth year.

William Lowder, M.D. was born at Southampton and graduated Doctor of Medicine at Aberdeen, March 6, 1775. He was a well-known lecturer on Midwifery in St. Saviour's Churchyard, Southwark. He died at his house in Upper East Hayes, October 24, 1801.

In the library of the Royal Society of Medicine, are four manuscript copies of Lowder's lectures. H. R. Spencer also possesses a manuscript of William Lowder's "Lectures on Midwifery" wherein speaking of the forceps, Lowder says that Levret's has the disadvantage of only being applied in one direction ; Smellie's could be applied in any direction. Dr. Orme had rather improved Smellie's forceps by making them further apart at the end, McKenzie's forceps was between Smellie's and Orme's. Lowder's objection to all these patterns was that the lock came too near the soft parts. Lowder recommends his own forceps which, he says, are an improvement of Dr. Orme's

Doran* exhibited and described a sample of this type of instrument. It is a straight and very short forceps with broad

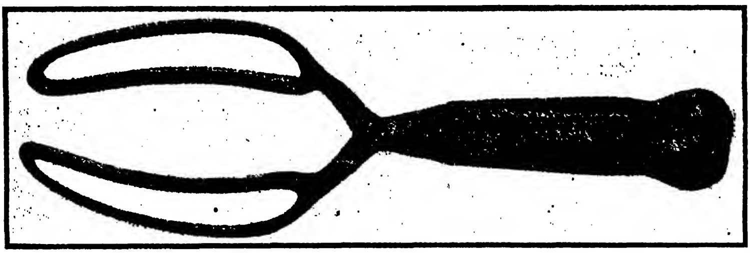


FIG. 244.
Orme-Lowder Forceps.
Loan collection, Museum. R.C.S.
(Doran).

blades, narrowing at the free ends, which lie far apart when the handles are closed. Its weight is 11 oz. or 312 grm.

*Progs. Royal Soc. Med. Vol. VI. History of Med. p. 60. Also Lowder—Ms. of lectures on the "Theory and Practice of Midwifery" 1782, preserved, in the Library of R. S. M.

It is evident that Orme devised the original type, but left no writings. The following two quotations, will however, prove his claim to priority. "(1) Dr. Orme thought he could improve on Smellie by shortening the forceps further, making the blades rounder and wider towards the lock to suit the parietal bones. I thought they might be improved by locking lower down in the handle to avoid pinching the mother, but when I came to use them I found they required more force to hold them together, *that what I gained one way I lost on* another"; Lowder implies that Orme's modification preceded his own.

(2) "Smellie's forceps was modified by Orme, Surgeon to Guy's Hospital and a Lowthero (sic), the highly experienced obstetrician of the same hospital" (De forcipe, Ormei, loc cit, i, p. 113). Kuhn states that he is not sure when the instrument was invented nor whether the honour is to be accorded to Orme alone or to Lowder as well. He describes Smellie's short forceps and Orme's forceps at great length and figures them side by side. He dwells on the broad blades of Orme's instrument with the wide fenestræ, which like the blades, are narrowest at the extremity, and the wide parting of the shanks above the lock. Smellie's forceps, Kuhn states, has narrower blades with narrow fenestræ, widest at the extremity and the shanks do not diverge widely above the lock. When the handles are closed the extremities of Orme's blades are 1 in. (4.12 cm.) apart precisely as in the forceps exhibited by Doran, though Mulder gives a different measurement.

Perhaps the most important witness as to the development of the Orme-Lowder type of forceps is Mulder. He states*:— "I will now relate in chronological order what several English authorities have contributed towards the improvements of the forceps.

*Geschichte der Zangen und Hebel, 1798 p. 80, Schlegel's translation of Mulder. The copy, in the library of the R. S. M. was in the possession of Dr. Rigby and against the reference to Kuhn, 1783, there is a pencil mark "my M. S. copy of Lowder's lectures in 1776", an important piece of evidence showing that the forceps is of older date, than we might otherwise suppose.

"First I must mention David Orme and William Lowder who are both Obstetricians in London and were my teachers when in past years I was residing there. They had made use of forceps already for several years different from any previously included in my collection. They have neither described their own instruments nor had them drawn but in the year 1783 Karl Gottlol Kuhn* published a description of the first-namely Orme's forceps—and as far as I know, is the first person who ever reported the instrument in print. (In a footnote Mulder refers to Kuhn's thesis and considers that the description is very correct but the drawing poor). As chronological order is strictly followed in this "Historia," I must place this forceps first. Lowder's forceps, which has not yet been reported or figured, I will proceed to describe on account of its resemblance to Orme's, of which it is only a variety, though according to the time when it was invented, it should not be placed immediately after the former. Orme's forceps consist of two blades which have not the new (pelvic) curve, but are straight. The blades have fenestræ and besides being not so long, differ from Smellie's in that they are broader at the base and narrower at the tip ; whilst the latter run each from a narrow base to a broad free end. Again the angle of divergence of the blades is greater in Orme's forceps and the ends, which in Smellie's come close to each other, are an inch apart (when the handles are closed). The lock and the handles resemble Smellie's. [Mulder adds in a footnote that Kuhn is correct about these distinctions, as he has authenticated them by inspection of a genuine Orme's forceps in his own (Mulder's) possession.]

"Lowder made Orme's forceps 1 in. longer but left it unaltered in other respects, save that he dispensed with the leather cover of which Orme approved. Orme's intent in altering the (Smellie's) forceps was to ensure uniform pressure on the fœtal head, an aim which, as I know from experience of this instrument, he has not attained. The shortness of all such instruments—must surprise everybody, but we need

*Carl Gottlol Kuhn's thesis (1783) reprinted in 1827 with his other works as the "Opuscula Academica Medica et Philologica" a copy of which is preserved in the library of the College of Surgeons.

KILIAN'S ARMAMENTARIUM. TAB. XVIII.

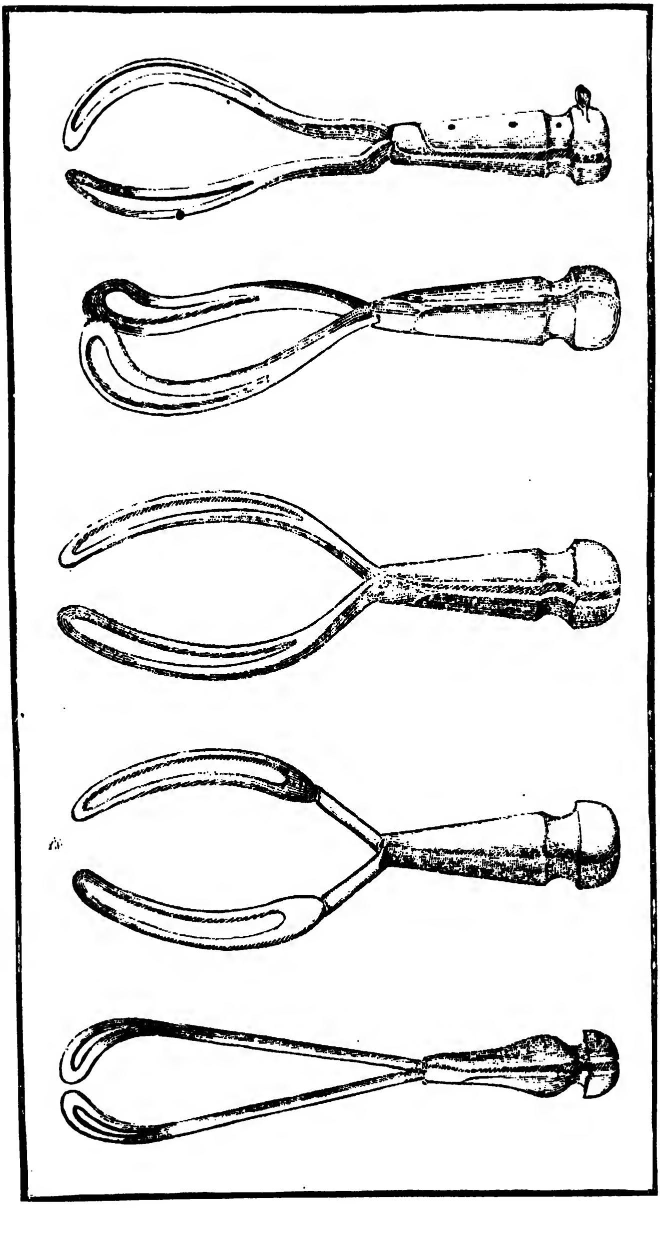


FIG. 245. Sleurs. FIG. 246. Ornie. FIG. 247. Lowder. FIG. 248. Young. FIG. 249. Evans.

no more wonder when we bear in mind that Orme never applied the forceps until the vertex had come down to the coccyx and perineum. Lowder's alteration served to protect the soft parts of the mother which are liable to be caught and bruised in the lock of the shorter forceps."

The college specimen (Fig. 244) seems to be a compromise between Orme and Lowder, being longer than Orme's, yet the handles are covered with leather. Perhaps the leather was only rejected for the blades. The Orme's instrument (Fig. 246 and 250) is very like the college specimen, though the divergence of the shanks is not so marked. Kilian represents the leather covering of the handles, continued up the shanks, only ending at the base of the blades. Possibly this was the case in the college specimen, as the upper part of the leather on both blades is ragged, as though it once went higher but has broken off in course of time.

Mulder figures both forceps (Orme Fig. 250 Lowder Fig. 252). In the college specimen the shanks diverge above the lock even more widely than in Orme's forceps in Mulder's plate; whilst in his drawing of Lowder's forceps he makes the shanks less divergent than in Orme's.

The museum of Guy's Hospital possesses a forceps marked "Lowder" very like a Lowder's forceps in its proportions but the blades as well as the handles are entirely covered with leather. The handles and blades are wrought in one piece but wood is let into the metal along the handles. The blades are 2½ in. (6.35 cm.) apart when the handles are closed.

Close by it, is another forceps of the Orme-Lowder type with shanks running upwards almost parallel to each other for over an inch, then they diverge at an angle of 70° to join the blade. The blade is not much broader at the base than at the free end which lies 1½ in. from its fellow when the handles are closed. The fenestræ are much narrower than in Mulder's type. It looks more like a primitive instrument than the well-known later modifications.

Description of Orme's Forceps (6) in Doran's Descriptive Catalogue:—

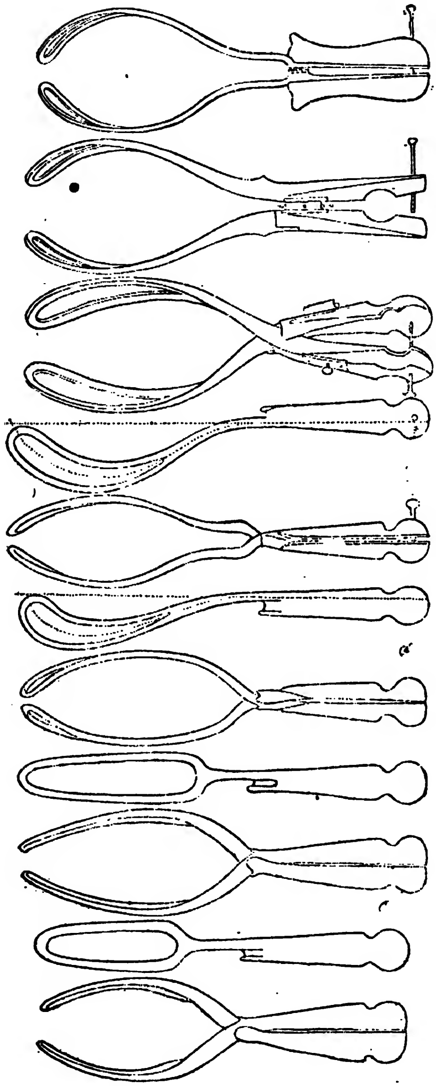


FIG. ;0. Orme. 252. Lowder. 25 Young. Evan 258. ken 259. ken 60. en

"This instrument in measurements and in the leather lining of the blades, which does not cover the fenestrae and in the character of its handles corresponds to Orme's original design according to Kuhn and Mulder.

Orme made the forceps shorter and the blades rounder and wider towards the lock. The broad blades become narrower towards the free ends which lie far apart when the handles are closed, whilst Smellie's forceps were broadest at the free ends which touched when closed. This instrument 10⅝ in. (27 cm.) is shorter than Lowder's (11⅓ in. Mulder) and its blades are covered with leather. It more resembles Kilian's drawing of Orme's forceps (fig. 246) than Mulder's (fig. 250).

There are many discrepancies in the descriptions, drawings and measurements of Orme's forceps and its modifications in the works of contemporary and later writers and some variations are seen in museum collections which do not precisely correspond to any modification described by these writers."

Description of Orme-Lowder Forceps (7) in Doran's Descriptive Catalogue.

"This instrument shows the characteristics of the forceps devised by Orme, as modified by Lowder. The handles bear a palm-rest and taper without any shoulder towards the lock. They are covered with leather, but it is not clear whether the lining extended to the shanks or ceased at the upper end of the handle. The lock is "English" after Smellie's pattern. The shanks are long curved and very divergent. The blades are of conspicuous breadth widely fenestrated throughout nearly their entire length and narrower towards the free ends which are far apart when the handles are closed. The blades have a wide cephalic but no pelvic curve and are quite flat on their inner surface.

This instrument is longer than Orme's; the handles are lined with leather which Lowder ultimately rejected according to Mulder. It is longer and stronger than Orme's original instrument."

Description of another sample of Orme-Lowder Forceps, (No. 8) in Doran's Descriptive Catalogue.

B. V

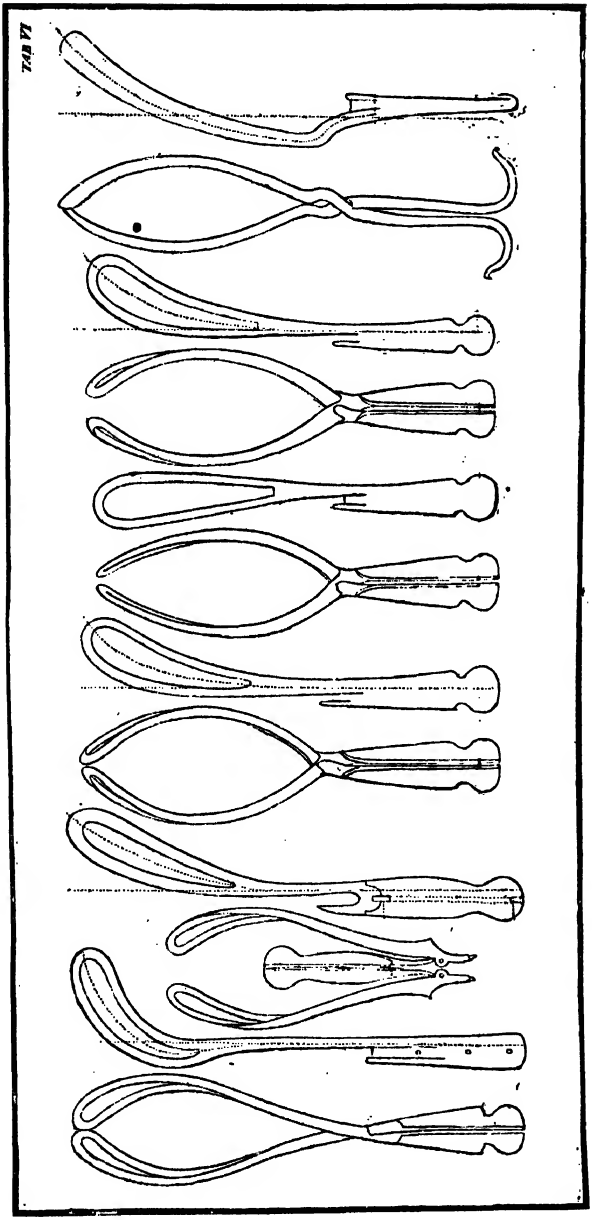


FIG ark 263. Sax 54. h. 66. 58. 269. e L 272 Laa

DER

This instrument is of the same type as 6 and 7. According to Mulder, it corresponds to Orme's forceps in its shortness, indeed it is ⅓ inch shorter and in its long distinct shanks (see Kilian's Armamentarium fig. 246) although Mulder, a pupil of Orme's gives no distinct shanks. Unlike Orme's it was clearly never covered with leather. It differs from Lowder's and Haighton's in being, like Orme's, much shorter and can be distinguished from Haighton's by the blades being, as in Lowder's and Orme's distinctly broader at the base than at the tip, whilst the fenestræ are not of such extreme width as in Haighton's forceps. In this instrument the fenestræ are intermediate in length between those of Orme (3½ in. 8.8 cm.) and those of Lowder and Haighton (4½ in. 11.4 cm.). This instrument was probably a late imitation of the original Orme-Lowder type as it remained popular even to the middle of the nineteenth century. Its handles are covered with smooth ebony and in all respects are of relatively modern type. In its extreme lightness 8 oz. (227 grms.), it recalls T. W. Beatty's (No. 30) and More Madden's forceps (No. 56), indeed it is lighter than either and one ounce (28 grms.) less in weight than Vacher's cross-handled instrument (55 A).

1783. Sleurs.

P. W. Sleurs, Military Surgeon constructed a forceps, the blades of which are fenestrated but very long compared to the handles. The curvature corresponds to that of Johnson. The fenestrations are shorter and their margins are flat and not slightly grooved like those of Levret's (see figs. 217 and 245).

1784. Young.

Thomas Young, Professor at Edinburgh, constructed a forceps, the blades of which were similar to Johnson's but slightly bigger and diverge at a wider angle. (See figs. 248 and 254).

1784. Evans.

In the forceps devised by Evans of Oswestry, there appear for the first time shanks diverging at the lock and then running

upwards almost parallel for over an inch. Aitken of Edinburgh, in the third edition of his "Principles of Midwifery" (1786) figures his own forceps with a space between the shanks and a screw in the handles. He accuses "a Dr. Evans of Shropshire" of passing off the screw as his own invention but does not imply that Evans adopted the shanks from his (Aitken's) forceps. (See Figs. 249 and 256).

1784. Aitken.

John Aitken,* Surgeon accoucheur of Edinburgh, describes four varieties of forceps invented by him. These do not differ from the other models except for the addition of a graduated screw quite at the extremity of the handles which permits of the necessary degree of separation of the blades while the instrument is inside the parts of the woman. The mode of articulation is also ingenious and is accomplished very simply by the intercrossing of teeth fixed on the inner side of each handle, near its origin. (See Evans). (Figs. 258—260, 283, 284, 295).

Aitken died in September 1790, in an attack of delirium whereupon Siebold makes the suggestion that many of Aitken's wonderful proposals were to be ascribed to an attack of madness! This suggestion is unjustified by anything in Aitken's book, whose advice is usually sound and sane.

1785. Mayer.

J. A. Mayer, Professor at Berlin tried to improve Levret's forceps. The forceps, however, is almost exactly like that of Levret or of Coutouly, only the portion of blade between the lock and fenestrum is 1 zoll bigger and goes straight out. (Fig. 296).

1785. Starke.

G. I. G. Starke, Professor at Jena, constructed a forceps which was described by his pupil Dobner.† This instrument has fenestrated blades, the margins of fenestration being not at all grooved. The curvature differs from that of Levret in so

*Principles of Midwifery, London 1784.
†De instrumentorum applicandoram necessitate (Jenae 1785).

far as it commences farther away from the articulation which is analogous to that of Smellie. (Figs. 234, 235, 261 and 262).

1788. Coutouly.

The following description is copied from Mulder's Historia.

In 1788 A. L. W. Mithof made the Forceps which Coutouly demonstrated before the Royal Academy of Surgery.

The following description of these Forceps has been given by Mithof. "Each Forceps consists of 5 parts and the connections were difficult and on account of this reason, it was almost unusable. The blades are exactly like those of Levret's. But there exists a great difference in the handle of the Forceps with that of the others. The male branch is connected with the female one by means of a screw 3 zoll. in length, which however must be rotated several times in order to connect the two branches. The blades are connected by means of clamps which as well as the handle itself are made up of wood. At the lower part of the blades there are round depressions in which the heads of the cross bar are fixed with a pin. The handle itself consists of one piece of wood. The second Forceps is also of the same form, only it had teeth in order to break the bones of the head."

This description of Mithof is obscure to me and I think it should be modified.

In order to get the exact description and a diagram, my teacher, Du Pui wrote to J. B. Schuring of Haeg who sent one diagram from Coutouly himself and furnished explanations and methods of use of the same. Through these, I am in a position to explain the description of Mithof.

I give the exact wordings of Coutouly, as sent by Schuring. From which one will be able to form an opinion whether Mithof was clear or obscure as regards the description.

"New forceps laid before the Royal Academy of Surgery in 1788, from Coutouly.

As regards the advantages of this instrument, the writer aimed at the simple side connection of the branches, which can be fixed round the head of the child by means of a screw, which goes up into a hollow nut through a long oblong opening.

1. The branches are not placed crosswise one above the other.

2. The approximation of the branches shall be easy.

3. The maternal parts are protected against bruises. In this respect these are superior to Levret's forceps as mentioned by the writer in the discussions at the Academy.

4. The compression on the head can be regulated by means of this screw and if desired can also be relieved whereby the life of the child can be saved, as death may result through prolonged uniform pressure.

A.A. The branches of the forceps 15 zoll long.

B.B. The Handle.

C.C. Clamps, which can be fixed to the handle as well as to any of the branches.

D. The 3 zoll long screw which unites both the arms at the will of the accoucheur.

E.E. The projections which are useful during pulling.

F.F. The flattened portion, for the ends of the handle to be taken out.

G.G. The quadrangular hole, one zoll long and three lines broad.

E.E. Spiral opening to receive the tip of the screw.

H.H. The branches of the Forceps with teeth, which the writer used instead of hook, and which he never used until the child was dead. (See Figs. 227 and 228).

N.B. The maximum breadth about the junction of the simple Forceps is one and half zoll. The maximum distance between the branches is 2 zoll. The maximum breadth about the junction of the toothed forceps is 1¼ zoll.

From every consideration of the original drawings, it is found that both the Forceps of Coutouly consists of two branches with fenestrated blades which correspond accurately. The arms are connected to the lower part of the handle by means of a transverse bar, which is provided with a clamp. This bar fits itself with its round ends into the depressions of the handle which is fixed by means of a pin which goes into the hole. These branches connected in this way, are further fixed to each

other above with a fixed width by means of a 3 zoll screw. The screw goes into the opening which is placed between the blades and the handles of the branches. One of these openings is elongated and according to Coutouly's opinion, can be used to unite the arms in unequal position. The handles are of wood and have projections on it which gives a firm grip to the fingers during traction.

The only difference between these two forceps of Coutouly is that in one, the end of the blade is toothed. The length of these teeth is 1½ lines.

It appears also that Coutouly thought of some change in the handle, *viz.*, that the transverse bar can give some form of grip and that one can hold by the other hand. One can see in the diagram marked by dots which appears to have been used for this purpose; but neither in the description of the writer, nor in the letters received, there was mention of this addition which can serve this purpose." See page 210.

1789. Lodi.

Gaetano Lodi, Surgeon in Catherine Hops. of Bologne used his own forceps which is described by Baldinger and Saxtorph. He has modified Levret's forceps with a steel regulator which will not cause any pain on the fœtal head nor the operator's finger during operation. No diagram is available.

1789. Pole.

Pole's forceps is referred to in Busch and Moser's "Handbuch der Geburtskunde" (Vide Savigny, collection of Engravings. London, 1797). No description or diagram is available.

1789. Wegelin.

Kilian gives a diagram of Wegelin's forceps. (See fig. 297).

1790. Haighton.

John Haighton, born in 1755, lectured in conjunction with Lowder on midwifery at the united schools of St. Thomas's and Guy's Hospitals, but was never appointed physician to either.

He was a distinguished physiologist and an excellent obstetric operator. He died in 1823.

Blundell,* nephew of Haighton, alludes to Haighton's forceps thus:—"Now of the straight forceps there are forms which I think deserve your approbation, though much nicety in the shape of the instruments is really not of much importance. The two forms of forceps are those of Dr. Orme and those of my predecessor, Dr. Haighton, a man to whom I owe everything that is good in precept and example. Dr. Orme's forceps are to be commended for their exact adaptation to the sides of the head and are formed with the blades and the fenestra so narrow that the opening will scarcely admit the fore-fingers. The main defect chargeable upon this instrument is, that when laid over the side of the head in the usual manner, the limbus (the bar of iron forming the blade and containing the fenestra) enlarges the cranium where if instruments really be required, it is generally already too large ; I mean over the protuberances of the parietal bones. Now Dr. Haighton's instrument has the advantage of a large fenestra, the limbus being made a little thinner ; so that the protuberance of the parietal bones lying in the fenestra on a level with the blade or even projecting a little beyond, there is no addition of bulk over the protuberances. If there be any defect in Haighton's forceps it consists in the breadth of the blades, which is so great that they are not very easily passed up through the genital fissure."

Doran observes that the essential feature of Haighton's forceps according to Blundell, was its wide fenestrae although Kuhn made out that Orme's had wide fenestræ as an essential feature. Radford† figures, what he specifically distinguishes as, Haighton's forceps which appears quite different from the instrument which Doran exhibited and from Orme and Mulder's forceps. There is no wide divergence of the shanks and the handle is much more slender. Doran thinks that it is, possibly, a late modification that Radford represents in his "Essays."

*Principles and Practice of Obstetricy. 1834, p. 520.

†Essays on various subjects connected with Midwifery, 1839 Plate "Division No. 2A, 1 and 2."

There is a reference in the Amer. Jour. Obs. V, p. 341 of an "improved Haighton."

Doran gives the following description of Haighton's Forceps in his Descriptive Catalogue.

"The most characteristic feature in this modification is the extreme breadth of the blades and fenestræ ; in some samples they are of almost uniform breadth throughout. The handles are lined with leather as in Orme's, the shanks are moderately divergent and the distance between the tips of the blades when closed is not great."

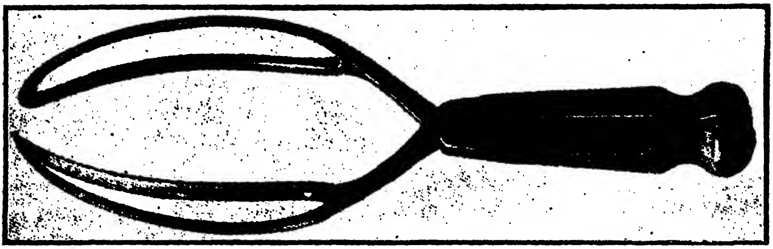
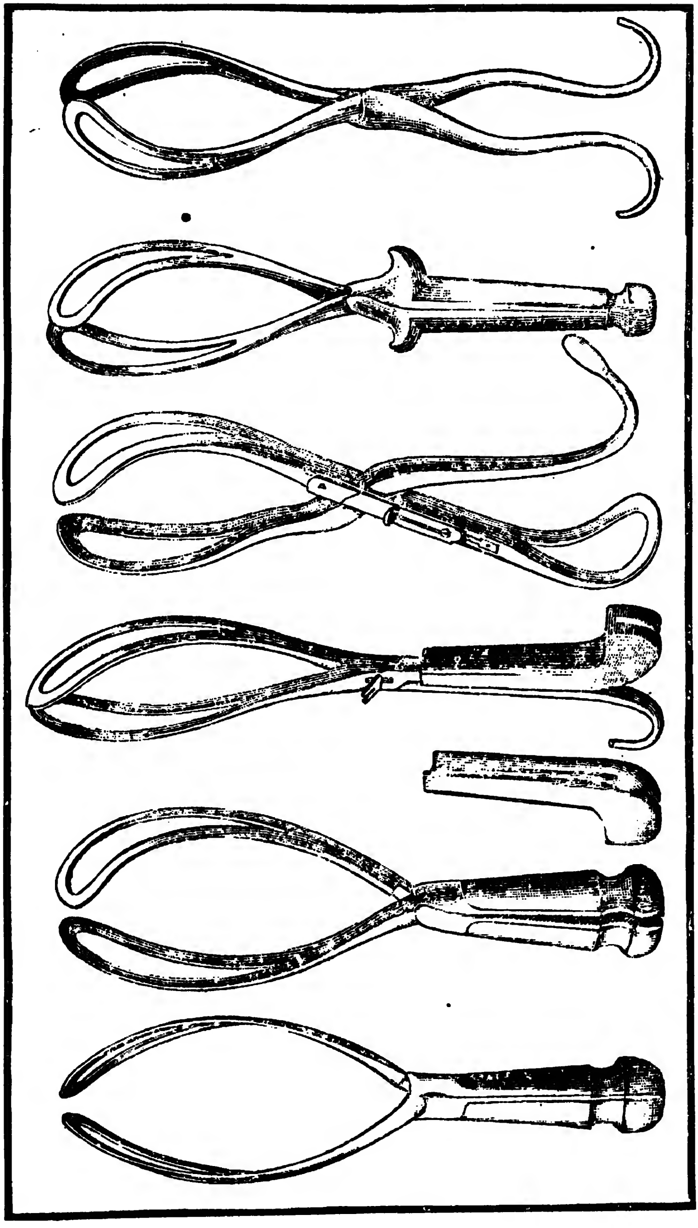


FIG. 273—Haighton's Forceps.
(Doran from Guy's Hospital Museum.)

The museum of Guy's Hospital contains a forceps marked "18th Century" and bears the name "Ferguson, Giltspur Street" a maker associated with St. Bartholomew's Hospital. "It resembles," according to Doran,* "in its general characters an Orme-Lowder forceps, but bears a Brunninghausen or German lock—a pivot with a broad flat head 7/8 in. (2.2 cm.) in long diameter fitting into a notch in the opposite limb, and it is not lined with leather but enamelled. The shanks 1½ in. long (3.8 cm.) are considerably divergent and the fenestræ very broad. Mr. Barry Hopkins informs me that a forceps of this type was once well-known in the trade and ascribed to Brunninghausen himself. The blades are similar to those of Haighton's forceps, but longer and not so square. Haighton's name has been closely associated with this type of forceps; indeed many dealers and

*Progs. Royal Soc. of Med. Vol. VI., History of med. p. 65.



practitioners took it for the generic denomination of the type, ignoring Orme and Lowder. It is however, as may be seen at a glance (Fig. 273) closely a development of its prototype—Orme's instrument. Although its deviser, Haighton was co-lecturer with Lowder, Mulder's teacher, it is not figured in the "Historia" and strange to say, Kilian does not represent it in his "Armamentarium." Yet it was once well-known in England and in 1825 David Davis wrote of it as the widest-blade forceps ever invented before his own."

"Dr. Fawcett and Dr. Cock who directed my attention to the 18th Century forceps in the museum of Guy's Hospital pointed out a "Haighton's forceps" in that collection probably invented about 1790, but possibly a few years later: it is an Orme's forceps with exaggerated breadth of the blades, which are broadest at the base, but narrowing to but a slight extent towards the tips, so as to look almost oblong. The fenestræ are 1⅝ in. (4.12 cm.) wide at the lowest and widest part where the width across the blades is 3¼ in. (8.2 cm.). The shanks part widely as in the College forceps but are thinner; the handles, on the other hand are very similar, they are lined with leather reaching close up to the lock and it is not clear whether the leather lining ended below the lock or covered the shanks up to the base of the blades as in the Orme's forceps figured in Kilian's "Armamentarium." The blades in the Guy's Museum forceps are ¾ in. longer than those of the College forceps and the fenestræ are broader, whilst the space between the tips of the closed blades, is on the other hand, ½ in. less. Unfortunately Haighton himself has left no published account of his forceps."

1791. Boer.

Dr. Radford exhibited Boer's forceps at the Obs. Soc. conversazione. The catalogue contains the following description under the general heading—short forceps. "Boer's double-curved, blunt hook at the handle-lock an oblong projection on one blade received into a mortice on the other." The New Sydenham society's Lexicon contains the following short description:—

"Twelve inches in length and resemble those of Smellie. The handles have a groove for the application of a bandage when they are in use." It is a light and short forceps fenestrated, with a very slight pelvic curve. The tips of the blades did not touch when the handles were closed. (Fig. 312).

Lucas Johann Boer was born on April 12, 1751, in Uffenheim, Bavaria, W. Germany. He was educated at Wurzberg, where he obtained the Degree of Master of Philosophy in his 17th year. He then engaged himself to the special study of Anatomy, Surgery and Gynaecology. In 1784 he was appointed a surgeon in Waisen. In November 1785 he started for a tour in foreign countries and successively went to Holland, Brussels, Paris, London, Edinburgh and Dublin and returned to Vienna in 1788 *via* Paris, South France and Italy. In 1789 he became Professor of Practical Obstetrics. He was fully busy with this branch of the profession until his death which occurred on 19th January 1835.

1791. Saxtorph.

Mathias Saxtorph, a Danish Obstetrician, constructed a forceps the blades of which were like those of Levret and the handles and articulation like those of Smellie. The special point of this instrument is that the handles can be folded over the blades, so that the size of the instrument becomes smaller, enabling it to be carried in a pocket.

In 1866 Nyrop of Copenhagen exhibited a Saxtorph's forceps, at the conversazione, held by the Obstetrical Society of London. It is figured in the Catalogue published that year. Nyrop particularly drew attention to the small pelvic curve and declared that most old practitioners in Denmark still used it. (*i.e.*, in 1866). Figs. 263, 264, 298, 299 and 300.

Mathias Saxtorph was born in the village of Meirup near Holstebro in Jutland in the year 1740. He became Doctor of Medicine in 1762. He studied in Vienna and Paris from 1767 to 1770. In 1771 he became what is called the "town-obstetrician" and was appointed a member of the royal midwives-commission in Copenhagen. From 1773 he was actively engaged in the practice of obstetrics. In 1785 he became obstetrician and

teacher of midwifery of Friedrichs-Hospital. He died on June 29, 1800.

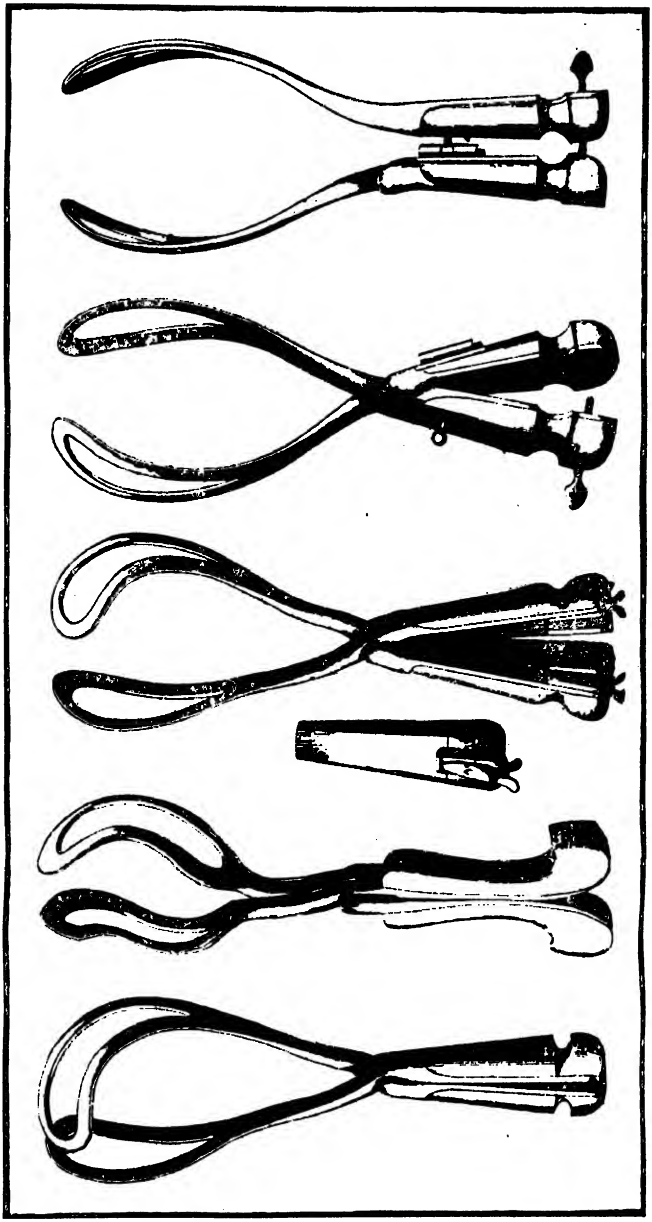
1791. Dubois.

The forceps of Antoine Dubois, Obstetrician of Paris, had Pean's blades without the groove at the margin of the fenestrum. The branches of this forceps are placed one over the other and are joined by a simple tablet and a screw, mobile on its axis and easily revolving on itself by means of a special key. There is no notch in the branches by means of which they can be interlocked. The axis is like that of Levret's last modification but without the slide plate. The joint is however so constructed that the blades can be made to retreat with the hand without having recourse to the key. The handles are peculiar inasmuch as they are made of tempered steel like the rest of the instrument but are covered over with a wooden muff, which can be drawn out, if required, disclosing at the end of the male branch a hook and which may be used by the accoucheur to extract a dead child. There wooden coverings can be removed from the steel handle by means of a screw which was used to fix it. There is also a screw for rotating the axis. (Fig. 276).

1792. Denman.

Denman gave due credit to Osbern, described the precise characters of that obstetrician's forceps and devised a forceps of his own, which was short, light and with slender straight blades without pelvic curve, broadest near the free ends, like Osborn's and Thynne's. There is no evidence that Denman ever contrived a modification of his own forceps with curved blades.

Thomas Denman was one of Smellie's pupils. He was born at Bakewell, June 27, 1733 and had his early education there. He came to London in September 1754 for his medical education. The money (£75) he had brought with him to pay the fees at St. George's Hospital and for two courses of Anatomical Lectures which he attended very assiduously, was wholly expended in six months. He therefore had to get some employment for his immediate support and on April 3, 1755 he



KILIAN'S ARMAMENTARIUM AB. XX

passed as Surgeon to a ship. He returned after a wandering life of nine years and determined to dissect and attend lectures on anatomy and midwifery applying himself specially to the study of this branch of medicine. He decided to set up in practice in Winchester but met with no success. On July 13, 1764 he obtained the M.D. degree of Aberdeen. He was elected obstetric Physician to Middlesex Hospital in 1769 and held that appointment for nearly 25 years. He died suddenly at Mount Street on November 25, 1815. He advocated a short forceps with the pelvic curve. He described Osborn's forceps as a miniature "Levret" which had the pelvic curve. It appears that there is an idea that Denman devised another short forceps with the pelvic curve. Doran however is inclined to believe that Osborn's forceps has been ascribed more than once to Denman. According to Denman's own observations Osborn's forceps was constructed before his own.

Mulder describes Denman's forceps as follows:—"This instrument has two arms with straight fenestrated blades. They are joined by an English lock and the handles are wooden. They differ from Smellie's forceps mainly in the relation of handles to the blades, in the distance of the blades from each other and in their breadth all made clear in the tables of measurements." Mulder says nothing about a pelvic curve. For measurements see Appendix.

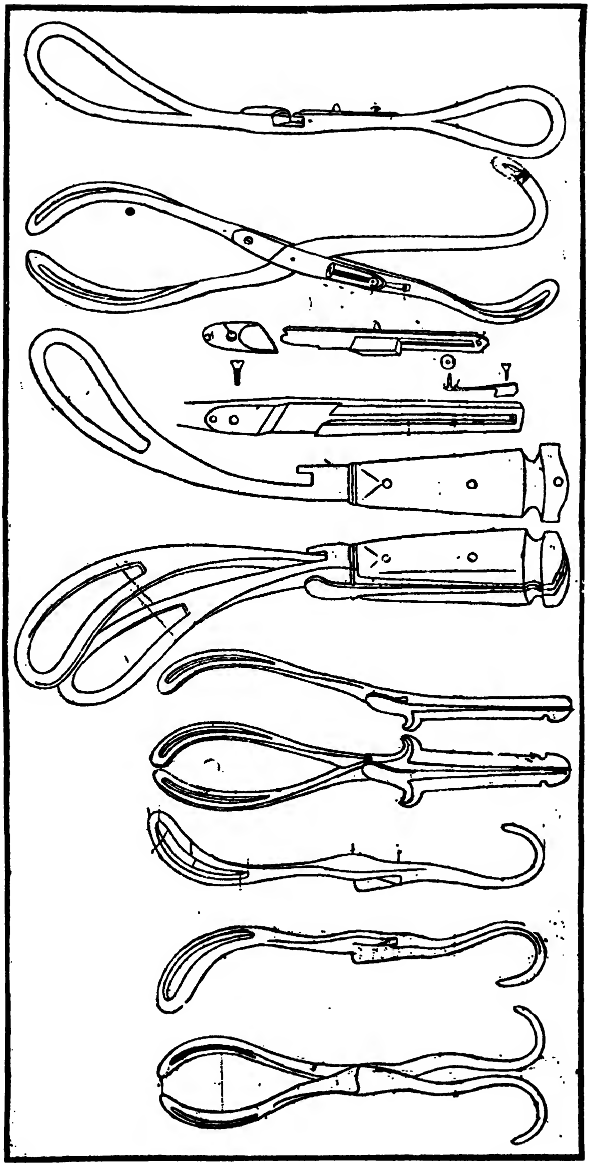
There is a genuine Denman's forceps, still partly covered with leather, in the museum of Guy's Hospital, the property of the late Dr. Tait, about 1837.

The following description of Denman's forceps is given in New Sydenham Society's Lexicon:—

Straight, handles parallel, grooved near the base for a bandage. Joint on the same principle as Smellie's. There are two forms—the long and the short.

The following description is reproduced from Doran's Descriptive Catalogue:—

"A straight forceps each limb forged out of one piece of metal, handles lined with smooth ebony the upper border forming a narrow shoulder. Palm-rest but no finger-rest. Blades with a wide cephalic curve and broadest at the tips which lie


TAB. X
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289.
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293.
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nearly one inch apart when the handles are closed. Shanks run into the upper part of the blades, with barely a trace of limitation, flattened antero-posteriorly. "Denman's forceps" shows a return to the type of Smellie's short straight forceps in the blades, which are broadest at their extremities, bear relatively narrow fenestræ and have no markedly distinct shanks, but it resembles the Orme-Lowder type in that the extremities of the blades, do not touch when the handles are closed.

The instrument here exhibited is of comparatively modern make, showing a trace of demarcation between the shanks and the blades." (Figs. 267, 268, 274).

1792. Thynne.

Thynne was a teacher of obstetrics in London. His forceps closely resembled Osborn's. The blades are fenestrated and are also curved. The lock is likewise a hinge and the handles are also wooden. The main difference is that in Thynne's forceps, the proportion of the blades to the handles is greater and the distance between the blades at the tips is wider, whilst on the other hand the angle at which the blades diverge is less. (Fig. 275).

1792. Osborn.

William Osborn, a friend of Denman and his fellow-lecturer, was born in London in 1736 and began his medical studies at Uppingham under John Fordyce. He studied in London under William Hunter and in Paris under Levret. In 1770 he joined Denman in founding a school of midwifery. Osborn graduated M.D. at St. Andrews, October 10, 1777. He died at his residence, Old Park near Dover on August 15, 1808.

Osborn did not give a full account of his forceps. Mulder gives a drawing of the whole forceps and of one blade placed sideways after the inventor's sketch. (Figs. 265, 266). Osborn's drawing represented only one arm. Mulder states, "When I was in London, I sketched the instrument itself as well as those of Denman and Thynne." "Osborn's forceps consists of two arms, the blades are fenestrated and have the *Curvatura Nova*

KILIAN'S ARMAMENTARIUM. TAB. XXII.

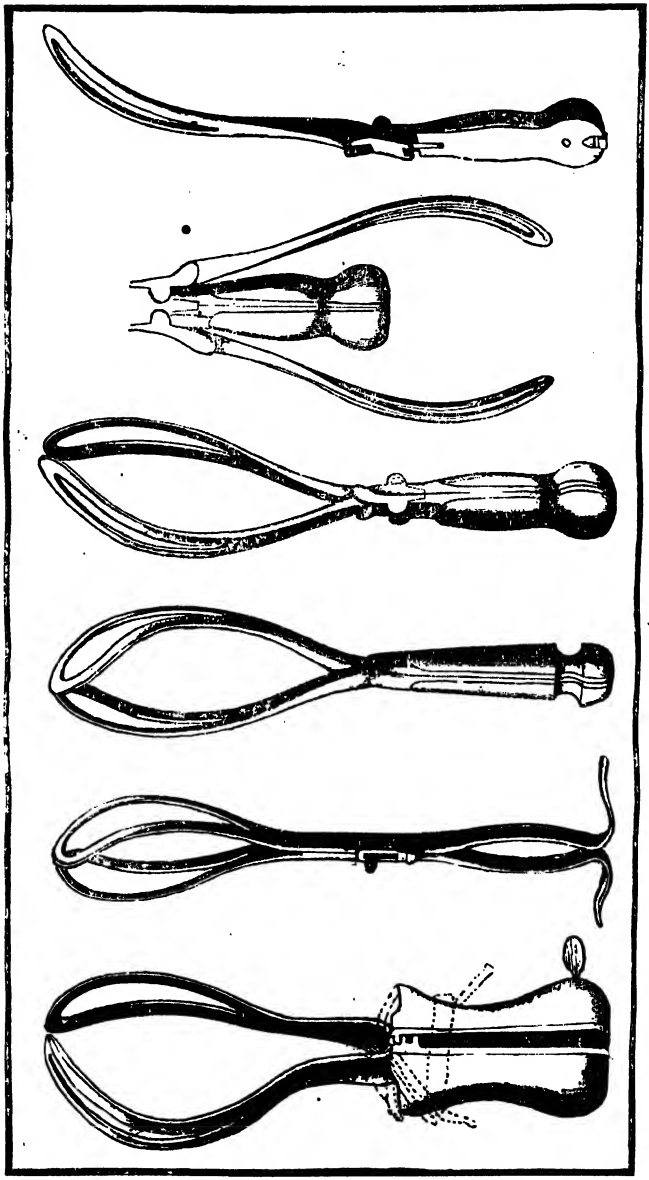


FIG. 295. Aitken. FIG. 296. Mayer. FIG. 297. Wegelin. FIG. 298. FIG. 299. Saxtorph. FIG. 300.

(pelvic curve) much as in Saxtorph's.* The arms are united by a joint (English) and the handles are of wood. Save in some of its measurements, this instrument differs little from Smellie's curved forceps as will be seen in my table of measurements under the names Smellie and Osborn."

Doran exhibited a sample of Osborn's forceps from the Museum of the Royal College of Surgeons, before the Section of History of Medicine, Royal Society of Medicine, on January 29th, 1913. The forceps was described as a miniature Levret, intended to combine the qualities of the long and the short forceps. It was completely enveloped in leather fenestræ included. It may be noted that instruments of this and other types similarly covered with leather, were used well into the middle of the nineteenth century. The measurements given under Osborn's engraving correspond precisely to those of this forceps in the College Museum. "Whole length, 11¼. (28.125 cm.) from the angle of the joint 6¼ in. (15.8 cm.) ; handles to the angles of the joint 5 in. 12.7 cm.) ; breadth between the blade near point 1½ in. (3.17 cm.). Osborn gives no other measurements. The distance between the extremities of the closed blades is ¾ in. (1.95 cm.) and the leather-covered fenestræ are 1⅞ in. (4.75 cm.) wide at their widest point. It wighs 11 oz. (312 grm.). Like most British forceps of its day, the handles have the usual palm-rest and taper to the lock, without any flange or finger-rest. The lock is of the English type. There is no distinction between shank and blade and the blades moderately broad, bear a pelvic curve and are broadest at the end and not very far apart there when handles are closed. Osborn preferred his forceps broadest at the extremity. (See Appendix of Measurements.)

The college specimen corresponds to a drawing in Osborn's "Essays on the Practice of Midwifery" 1792 p. 50. Denman had already referred to this forceps in 1783. ("A Vindication of the forceps described and recommended by

*Mulder gives the date of the publication of Saxtorph's forceps as 1791, Osborn's appearing in 1792. Saxtorph's was like Osborn's a miniature Levret, a short curved forceps in fact. (Levret I. 18 in. long; Levret II. 16½ in.; Saxtorph 12 in.; Osborn 11¼ in.).

Dr. Leake") saying: "The curvature of the Levret forceps seems the most convenient and Mr. Osborn has contrived a very elegant pair, by diminishing the size of Levret and very little alteration besides." (Doran's Descriptive catalogue, 1921).

1793. Hamilton.

This forceps was used by Dr. James Hamilton Junior, the son of Dr. Alexander Hamilton both in their day Professors of Obstetrics in the University of Edinburgh. It was a short forceps with a pelvic curve. It is not clear whether the father or the son was the actual inventor of the instrument.

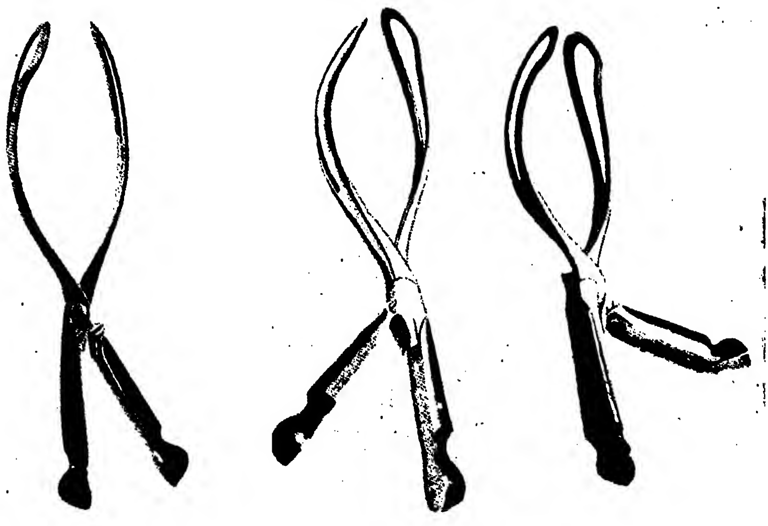


FIG. 301.
Hamilton's Forceps.
Loan Collection R.C.S.
(Doran).

FIG. 302. FIG. 303.
Hamilton's Forceps.
Museum of Edinburgh University.
(Doran).

The following descriptive notice of the forceps appears as a footnote to an article on "Observations on the instrument employed in the Practice of Midwifery, commonly called Lowder's Lever" by Dr. J. Hamilton, in Andrew Duncan's *Medical Commentaries for the year* MDCCXCIII Decade Second, Vol. VIII p. 405.

"It is not consistent with my views in this essay, to describe minutely the form of the forceps. Those which I use are nearly of the same shape as those of Dr. Wallace Johnston. The length of the instrument is 11 inches; that of each handle 4½ inches. If a straight line be drawn through the centre of the plane surface of one handle and be produced to the extremity of the instrument (which forms the axis of the handles when both are joined) the convex edge of the blade at the greatest distance from this line, is distant 1⅜ inches; and the extreme distance of the point, on the opposite edge is 13/16ths of an inch. When both blades are joined, their greatest width is 2¾ inches. The right-hand blade has a hinge between the handle and blade, by which it is easily introduced, while the patient lies on the left side."

Hamilton's forceps are familiar objects in museums in British Isles. The remarkable variations are striking. Doran in describing a sample in the Loan Collection of the R.C.S., says that in measurements the college sample does not entirely agree with Hamilton's original report, being longer. It should be remembered that this instrument was frequently modified.

Doran describes the college sample as follows: "The Loan Collection includes one sample of this joined forceps where the joint is on the handle of the right or upper blade. This handle, we must bear in mind, is on the left of its fellow, since the blades cross as usual at the lock, which is of the "English" or Chapman-Smellie type. The handle opens outwards. This joint is characteristic of Hamilton's forceps, but it will be shown that in some samples the joint is on the handle of the left blade, whilst in others it opens backwards instead of outwards."

"The weight of this instrument is 12½ oz. (354 grams.) its length 11 in. (28 cm.); the length of the blades 6½ in. (16.5 cm.); their breadth 1½ in. (3.8 cm.); the blades are broadest near the tip, the greatest breadth being 2¾ in. (7 cm.). The space between the extremities of the closed blades is ½ in. (1.27 cm.). The length of the fenestræ is 4¾ in. (12.1 cm.), their greatest breadth 1 in. (2.5 cm.)."

"The blades are stout and have a strong pelvic curve marked at the free ends, their inner surfaces are plane. They

have no distinct shanks. The fenestræ are relatively narrow and are rounded at their lower extremity to allow of the application of tapes. Both handles are lined externally with smooth wood. The lock is of the English type with a clip on each blade as in Smellie's and most later British forceps and immediately below it the handle of the right blade bears a hinge so that it can open outwards."

The Obstetrical Museum of Sir A. Russell Simpson in the University of Edinburgh, contains several modifications of Hamilton's forceps. (See Figs. 302—307). The hinge joint on one handle, close to the lock, is common to them all, and the

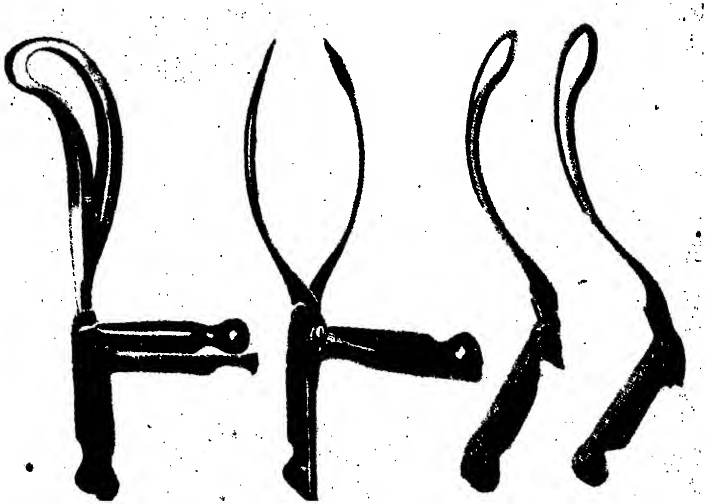


FIG. 304 FIG. 305. FIG. 306. FIG. 307.
Hamilton's Forceps in the Edinburgh Collection.
(Doran).

blades are similar. In figs. 302 and 303 two forceps are shown. The joint is in the handle of the left blade in one, whilst it is in the handle of the right blade in the other as in the sample in the Museum of the college of surgeons. In fig. 304 we see one Hamilton's forceps where the hinge is on the handle of the right blade and opens *backwards*. In the next (fig. 305) the

hinge is on the same handle but opens *outwards,* the forceps being almost identical with the college specimen. Next, figs. 306, 307, come two single right limbs of forceps with Hamilton's joint on the handle of the right blade. But the handle bends *inwards* on the joint and each has a special mechanism for keeping the joint fixed. In one a slot is seen on the inner side of the handle, a little below the hinge. It lodged a screw which could be fixed into the lower extremity of the blade which overlaps, the outer surface of the hinge. In the other there is a pin trigger arrangement which fixed the handle at its lower extremity where a notch can be seen. The trigger runs along the handle and its head may be detected projecting into the tapegroove of the palm-rest. On pulling down the head, the blade is liberated and may be folded down on its hinge. These hinges made to bend the handles inwards, were, we may presume, designed to allow of convenient packing. They could hardly have served for any directly obstetric purpose.

Dr. R. W. Johnstone is of opinion that the instrument in Fig. 305, with the right blade opening *outwards* is a Hamilton's forceps of the original type, as it corresponds to the measurements given in the footnote to Hamilton's article quoted above, more closely than any other.

It may be that the idea of a hinged handle was popular for a time, but experience showed that the hinge was of doubtful value in any form.

1793. Rawlins.

Rawlins described a forceps in "A dissertation on the Structure of the obstetric Forceps pointing out its defects and especially of those with double curved Blades at the same time showing particularly the safe Application of those with single curved Blades as geometrically proportioned and constructed, and likewise showing the Necessity and good Effects of several new forms of the single curved Blade as the Narrow Fanged and Reflected in certain Cases of retarded Labours . together with Cautions and Reflections on the Conduct and Management of Labours in general by R. Rawlins, Surgeon, Oxford, 1793.

MULDER. TAB. XI.

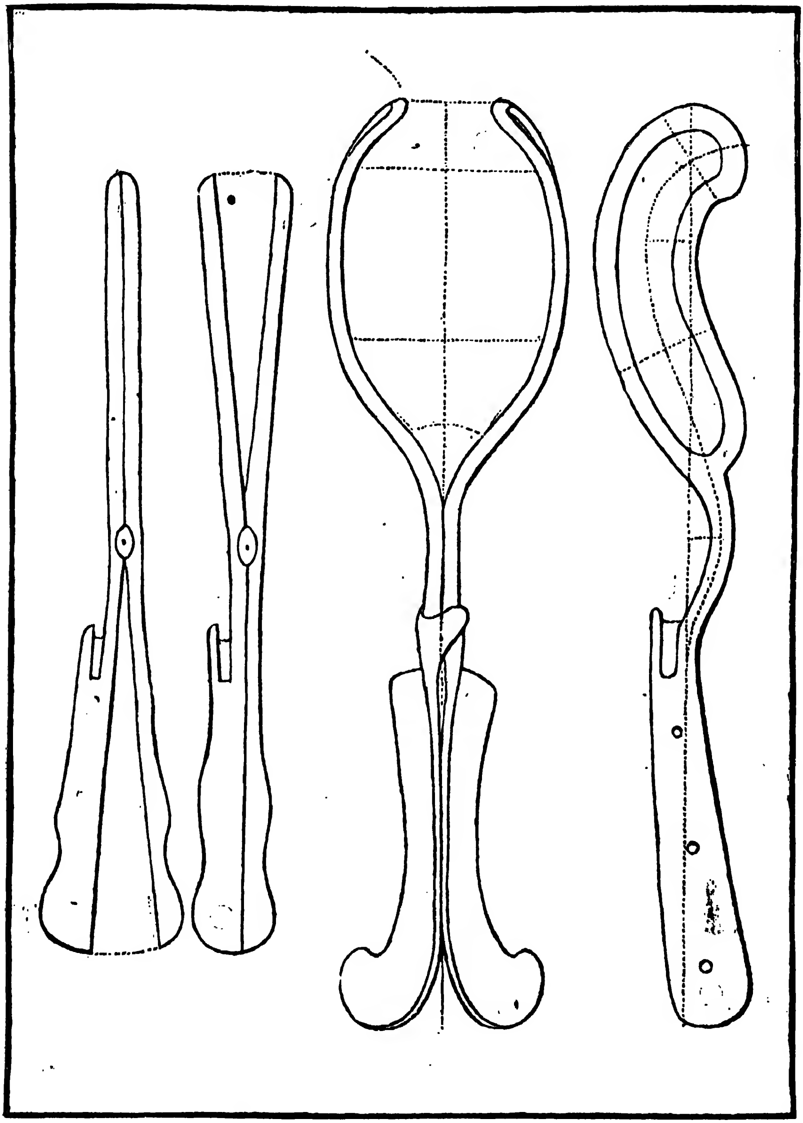


FIG. 308. FIG. 309.
Rawlins.

FIG. 310. FIG. 311.
Mulder.

For critical reviews of this thesis see (1) Gottinger Anziegen, 1794, Part 150, p. 1499 and (2) Stark Archiv, Vol. VI, Part 2, p. 365. Schlegel in the Appendix of his translation of Mulder's Historia states that Rawlins advised the blades of the forceps to be made smaller and non-fenestrated. His 'divided' or 'fanged' forceps could be easily introduced, while there would be difficulty with the usual type of blade, hitherto employed. The pieces are united by means of a hinge and they go apart from each other after they are applied to the head. (Figs. 308, 309).

1794. Mulder.

Johann Mulder describes his forceps in the Appendix to his "Literary and critical history of forceps and lever." His forceps is also described in detail in J. G. Klees' "Remarks on a new forceps." Frankfurt a Main, 1794, m. i. Kpfr. 8. The author evidently attempted to combine, what he believed to be, the good qualities of the forceps collected and described by him; so as to evolve a perfected type.

He says:—"The forceps must have two branches and the blades must be so curved that they will accurately adapt themselves to the fœtal head. The blades should diverge at an angle of 60° and the tips of the blades should be 1⅓ zoll apart. The portion between the lock and the curve must be straight and the blades, viewed from the side, must possess the new curvature as in Johnson's and must be of uniform breadth throughout as in Orme so that the portion of the fenestrum towards the lock would be much bigger than usual. Lastly the margins of the fenestra must be like Johnson's—made thin from without inwards, so that uniform pressure may be exerted on the head. The blades should not have any form of covering. The branches should be joined together by means of a lock. The handles are of wood, thicker below the lock, hook-like at the extremities and rise to some height as in DuBois. The proportion of the length of the handle, *i.e.*, from the middle of the lock to the extremity to the length of the blades is as 3 : 4. (Figs. 281, 310, 311).

1794. Santarelli.

Thio Gereme Santarelli, was an accoucheur of Vienna. The important modification of his instrument consisted in a fenestrated lever, at the lower end of one of the handles, while the other handle ends in a blunt hook which encloses another which is sharp. (Figs. 277, 292, 293, 294).

1794. Klees.

George Klees a German physician, constructed a forceps which was remarkable for its unusual dimensions.

1795. Weisse.

Weisse, gynaecologist and surgeon of Dresden modified and improved Levret's forceps. Carl Gottlob Stohrer gives the following description of Weisse's forceps in his Doctorate thesis. "Weisse's forceps resembles exactly that of Levret's in size and curvature except in the lock, so that the margins of the fenestrum are not furrowed. The lock is that of Smellie but not exactly the same, as the branches cover the whole of the lock. The branches also do not diverge immediately above the lock but run rather one over the other before they separate from each other. The handle is of steel and ends in blunt hook, which resembles in form a foot-hook. This hook can be used with advantage in breech-labour. (Fig. 279, 285, 286, 287).

1796. Wrisberg.

Helm describes Wrisberg's forceps and gives an illustration of the instrument. (Figs. 290, 291).

This forceps resembles that of Smellie very closely and differs only in certain measurements as may be seen from the table of measurements. It is more curved and the curvature commences from the handle. The lock and the handle are exactly like those of Smellie.

1798. Busch.

J. D. Busch, Professor at Marburg, introduced a forceps, of which the branches are longer than those adopted by Smellie.

The handles have wood on the outside and a labimeter is attached to the lower extremities. The hook instead of being at the lower end of the instrument, is placed, below the articulation.

The following description of D. W. Busch's forceps with finger-rests is reproduced from Doran's Descriptive Catalogue:

"This long forceps of an old type has been covered with black rubber. The long handles have a palm-rest but smaller than in the English type, there are very wide flanges; more correctly called finger-rests (see note on Simpson's long forceps No. 26) and the lock is English with the clip omitted on the handle of the right blade (see No. 3). Each handle much thinned, is prolonged for 1½ inch (3.8 cm.) above the finger rest. The blades have a marked pelvic curve and are flattened antero-posteriorly for some way above the lock. The inner surfaces of the blades are very slightly convex.

Johann David Busch invented this forceps (see fig. 278) and described it (*vide* Starck's Neues Arch. 2 ter B., erstes Stuck. S. 109 and Arch. f.d. Geburtsh. Jena 1796 vi, 438: 1801-2, ii, 109). He introduced the finger-rests. By the application of the fore and middle fingers to the rests, traction is greatly facilitated. The finger-rests may have been suggested by the "blunt knobs" on the handles of a forceps designed by Aitken and described in the third edition of his "Principles of Midwifery" 1786; but Aitken meant that the fore and ring fingers should be placed in the "blunt knobs," in order to protect the maternal parts, the middle finger being placed in the space between the shanks. J. D. Busch's finger-rests designedly intended for oscilitating traction, met with the approval of his more celebrated son Dietrich Wilhelm Busch, who added the trifling modification here present namely the lengthening of the handles for over an inch above the finger-rests (see fig. 278). In this sample the handles are constructed so that their inner surfaces do not touch between the ends and the lock. The practice of coating forceps with rubber seems to have been introduced by Osiander at the end of the 18th century (see Schlegel's translation of Mulder's work "Geschichte der Zangen und Hebel" 1798, p. 120. See also Doran "Some Eighteenth

KILIAN'S ARMAMENTARIUM. TAB. XXIII.

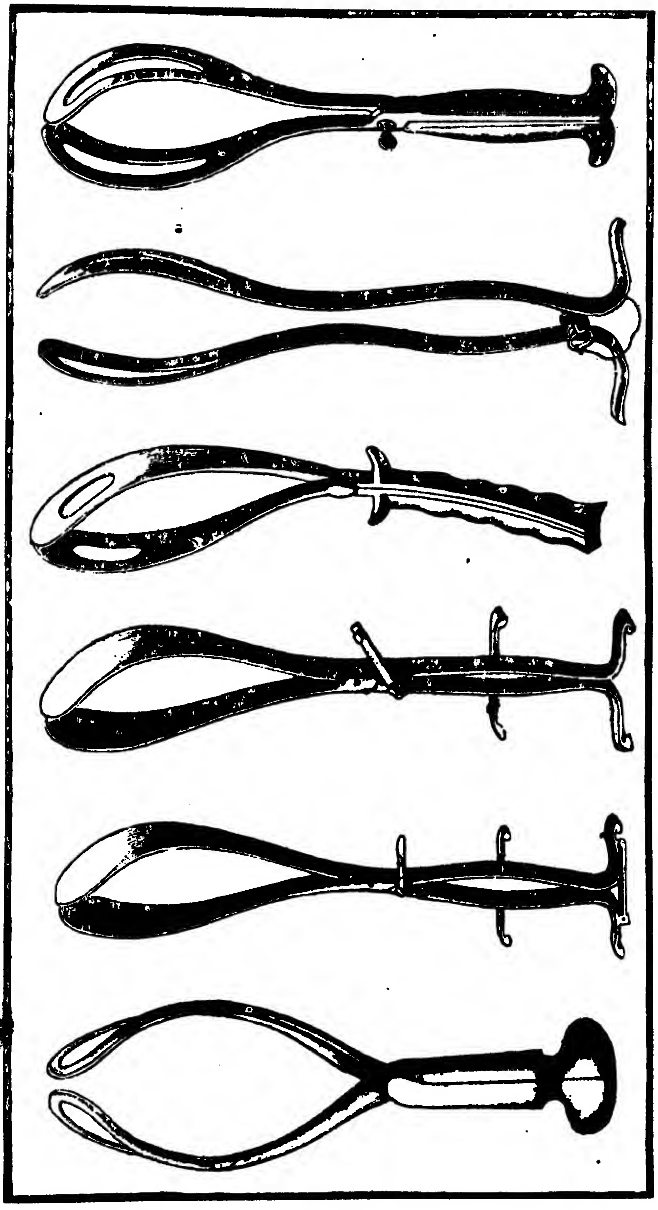


FIG. 312. Boer. FIG. 313. Osiander, a. FIG. 314. Osiander, b. FIG. 315. Brunnighausen. FIG. 316. Thenance. FIG. 317. Siebold.

Century forceps in the Museum of the Royal College of Surgeons of England" *Trans. XVIIth. Internat. Congress of Medicine*, Section XXIII, History of Medicine, p. 445).

The characters of the forceps of W. H. *Busch* (as described in his "Lehrbuch der Geburts Kunde") are as follow:—

(1) The large delivery forceps must be of good hard steel carefully polished and of 15 zoll in length.

(2) The cephalic curves must be $2\frac{3}{4}$ zoll at its widest part while the tips should be 5-6 lines from each other.

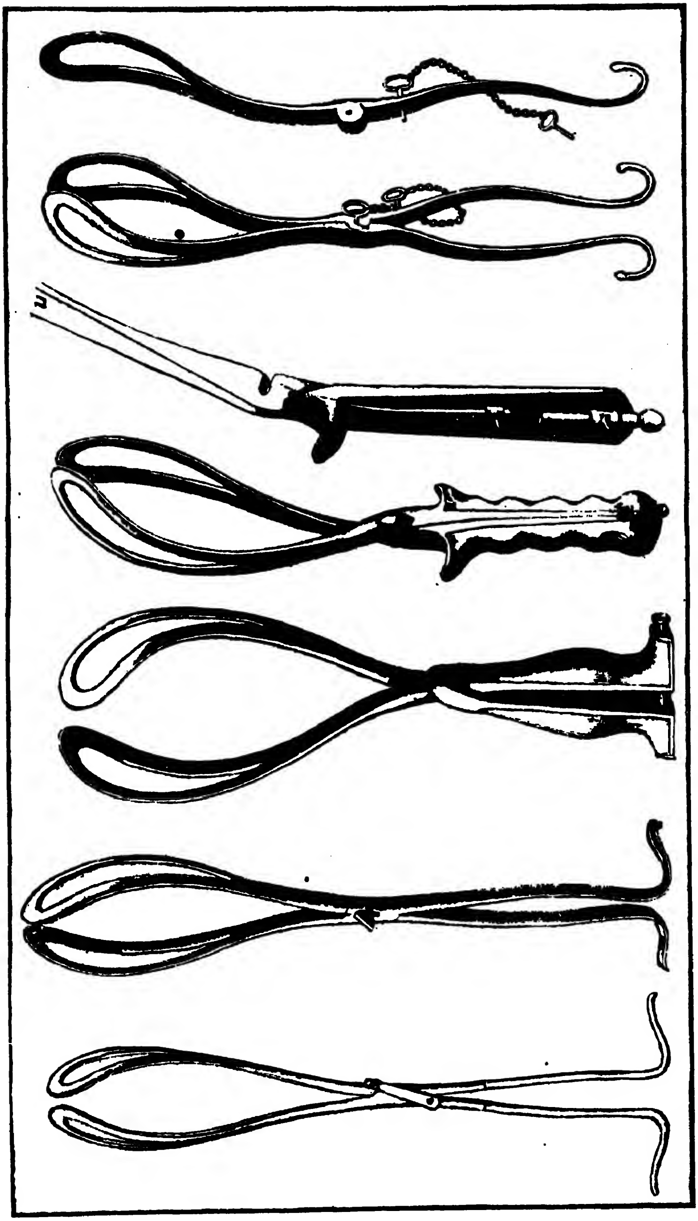
(3) The pelvic curve gently rises upwards from the lock and becomes marked at the upper part in order to be able to grasp properly the highly placed head between the promontory and the symphysis pubis thus the perineal curve and the unequal length of the blades, become unnecessary. The blades measure 8 zoll from lock of the forceps up to the tips, and the pelvic curve of the instrument must be $3\frac{1}{2}$ zoll in height.

(4) The blades with the margins of the fenestræ must be smooth and the fenestræ should be of medium length.

(5) The lock should be about the middle of the forceps and should be situated, not more than 7 zoll from the lower end of the handle. It must be simple, easy to work, and firm. The socalled English lock, in which a strong rod in the left blade fits in a groove on the right one, is eminently satisfactory.

(6) The handle is thinly covered with polished wood and possesses 2 hook-like projections near the lock which may be useful in practice, in difficult cases while the projections at the lower end of the handle are injurious and during use not necessary but may cause too much pressure which is injurious.

(7) The forceps may not be more than one pound and 20 Loth in weight but must not be too light for the necessary strength required. Pressure regulator, Labimeter, and cephalometer are unnecessary, and their introduction makes the forceps unnecessarily heavy. Although one forceps possessing these characters acts equally in both difficult and easier cases, one can use a second instrument for the easier case with lowly situated head and slight resistance to overcome, which will not be equally useful in difficult cases, but, on the other hand, will have the advantage in being easy and painless to use. The principal



advantages of this forceps are as said before, its length only 13 zoll, its cephalic and pelvic curve smaller, and its weight, not over one pound.

1799. Osiander.

Osiander, Professor at Gottingen, constructed two forceps. They do not differ from each other except for their length. One is meant to catch the head of the fœtus above the superior strait. The new (or pelvic) curve is little more pronounced. The blades of these forceps are not fenestrated. The articulation is made by a tablet with a fixed pivot, which, a slab fixed to the lower (or male) branch below the articulation, can rotate at will, thus preventing the upper (or female) branch from leaving the pivot. The handles are supplied at their lower end with a kind of labimeter, for the purpose of measuring the separation of the blades. In addition to the two hooks at the end of the instrument there are two others, 10.2 cm. above these, so that these latter serve as a point of support for the hand placed below the articulation during extraction. (Figs. 313, 314).

The following account by Doran of the life and work of Osiander is quoted in full:

"This distinguished obstetrician appears to have been the first advocate of the forceps as an instrument which should be used and not unsparingly by every practitioner. His principal teacher, George Stein, was an out and out supporter of the forceps, insisting on the superior merits of Levret's instrument, and rejecting all modifications, "deformed bastards" as he called them. As Stein's instruction was delivered about 1781, there were, as Mulder testifies, a considerable number of "missgestaltete Bastarde" already in use. Stein held that compression played the chief share in the action of the forceps, and affixed to the handles of Levret's forceps a scale or "labimeter" to ascertain the size of the fœtal head and the degree of compression exercised by the operator. But neither Mulder nor Kilian figure Stein's labimeter. About forty years ago Kristeller of Berlin devised a forceps with a scale to measure the degree of compression, on its handle, and a

sample is preserved in the Obstetrical Society's collection at the College of Surgeons.

The pupil became a great advocate of the forceps, but it would be interesting to know what Stein, who lived till 1803, thought of Osiander's remarkable modifications. Friedrich Benjamin Osiander was born in Zell unter Aichelberg, in Wurtemberg, in 1759. He took his degree at Tubingen University in 1779, and immediately entered into private practice at Kircheim unter Teck. He became known as a very industrious young practitioner and gained a large midwifery practice; before he had reached the age of thirty he grew convinced that it was the duty of the doctor to shorten delivery as much as possible when the natural powers failed and for that aim turning or the forceps was the best agent. From that conviction he never [illegible]ed, though he gave up his practice and studied under pelvi[illegible]ors of obstetrics. The first was Siegwart of Tubingen of wh[illegible]then Osiander studied in Strassburg a year later. But in Caesar[illegible] worked under Stein in Cassel. Stein placed high trust force[illegible]pupil, leaving him in charge of his private home and much [illegible] private obstetric practice. Osiander declared that Stein in fa[illegible]onfirmed his own views and experience by teaching him ma[illegible] scientific and systematic manner the advantages of the [illegible]ceps, skilfully applied. Then Osiander returned to Kircheim, where he managed to resume his large private obstetric practice and demonstrated and defended the use of the forceps before sceptical and hostile fellow citizens. He also studied the history of obstetrics from the earliest times. By 1792 he not only had used the forceps freely, in 39 out of 168 cases in fact, but he had performed his first perforation, which was to be his last. He abhorred that operation and taught that the forceps should be used up to the limit where Caesarean section was absolutely demanded—a conjugate of 2¾ inches or 7 centimeters. Known by 1792 as a most experienced obstetrician, he accepted the professorship of obstetrics at Gottingen. As director of the maternity institute attached to the University he worked with the most exemplary diligence for nearly thirty years. His teaching was strenuously opposed by Lukas Johann Boer (1751-1835) of Vienna. The latter no doubt was right in objecting to much of

Osiander's teaching, but it must be remembered that Boer in 1790 applied the forceps in delivering an Austrian Archduchess and lost his august patient within a few hours, although he saved the child, a princess. This, and domestic troubles, preyed on Boer's mind. The literary war was continued after Osiander's death in 1822 by his son, John Frederick Osiander, D'Outrepont Boer's pupil, defending his teacher. Ingerslev ably throws light not only on the teaching but also on the practice of Osiander. Forty pulls of the forceps marked the limit where if extraction failed perforation was allowable, but Osiander himself boasted that he had pulled 175 times in some cases and 100 times in a good number, yet without the slightest harm to mother or fœtus. Holding fast to his determination, he never did a craniotomy in the Gottingen maternity. Between 1792 and 1822, 2,540 labours were treated in that institution. Out of ... 1016 were forceps cases and 111 were delivered by t... of Forty per cent of forceps cases naturally called for the ... of the of Boer and even less hostile obstetricians. In his firs... stru- 1792, Osiander used the forceps in 8 out of 16 cases an... hese formed version twice. In 1801 we find a "record" of 59 f... the cases out of 93 deliveries, with 8 versions and 1 Cae... section! 13 over half the total looks like "meddlesome ...of wifery." At that same date, as has been shown, Mursinn... applied his forceps in 5 out of 260 labours, or under 2 per cent. In his later years, as Gurlt and Hirsch point out, Osiander used the forceps much less frequently, and it is significant that his son, also professor of obstetrics, employed it even less, though he strongly defended his sire against the assaults of Boer and his pupils.

Osiander was the author of several text-books, a Handbuch der Entbindungskunst, a Lehrbuch der Hebammenskunst, and a Lehrbuch der Entbindungskunst. The third was a good, though rather partial history of obstetrics, the model for many which succeeded it. Another work was a singular little illustrated book Epigrammata in Diversas res Musei sui Anatomico et Pinacothecoe cum figuris aere incisis et expressis, a copy of which is preserved in the Library of the College of Surgeons.

Osiander's warfare with Boer in medical journals is accomplished and long forgotten.

Siebold, who was personally acquainted with him declared that Osiander won laurels that could never fade and that no foe could tear from his brow. He paid the greatest attention to the forceps, using at first a lengthened Levret (the shortest of Levret's three forceps measured 15½ inches and the longest 18 inches), and then inventing one, very long and strong, which could be used by him even when the head lay very high. Gurlt and Hirsch, in a good summary of Osiander's life, conclude that in accordance with his teachings and practice, Osiander's merit lay exclusively in the direction of strict operative technique, correct application of the forceps and dexterity in the performance of version. He invented a large number of instruments, pelvimeters, dilators, metrotomes, hysterotomes and vectes, all of which soon fell into disuse, like his method of performing Caesarean section and like—most interesting of all—his obstetric forceps.

Osiander's forceps was indeed a remarkable weapon, bigger in fact than not a few patterns of the cephalotribe. Whilst his master Stein denounced all modifications of Levret's instrument, Osiander designed a forceps different from all previously constructed. The blades were not fenestrated, for he considered that solid blades allowed of the best possible hold of the fœtal head, opposing to it a wide uniform surface. Each handle bore two finger-rests, one was the ordinary projecting terminal portion, forming almost a right angle, familiar in foreign forceps, the second was a flange not immediately below the lock as in Aitken's, Busch's and much later, Simpson's forceps, but halfway between the pin end and the lock. The earliest pattern of Osiander's forceps was provided with a rack and lock at the free end, such as Gayton added to his straight forceps in 1863, but this was omitted as unnecessary we may presume, in the later pattern. Ingerslev reminds us that Osiander likened the forceps to two artificial hands, and therefore, contrary to his predecessors and successors, he called the blade corresponding to the left hand the left blade and *vice versa*. Ingerslev, who dwells at full length on Tarnier's great invention, considers

that Osiander was the first obstetrician who recognized that something was wanting for insuring the right direction during traction, the problem which the great French obstetrician ultimately solved in 1877. More recently, Dr. J. Munro Kerr refers to Osiander's practice in respect to traction. He notes how Saxtorph, Dane, suggested the passing of bands through the fenestræ of the blades with the object of obtaining traction in the axis of the pelvis, and Stein, his pupil, seems to have made use of that contrivance. The practice of pulling on the handles with the right hand and pulling on the shanks with the left, generally termed "Pajot's manœvre" was described by Osiander, Stein's pupil, though it was really first suggested by Saxtorph.

Lastly, but most to the point in the present article, Osiander set up a lock of his own. He rejected the button screw and the pivot and mortise of the French, and objected to the English lock. The blades were simply opposed, a pin in the left lock fitted into a hole in the right, and a block-lock secured them. This lock is that adopted by Mursinna. (See figs. 325, 326, 327). Mursinna, approved highly of it. In Kilian's drawings of Osiander's forceps (figs. 313, 314) the block-lock bears a small thumb-piece to fix it in the groove in the blade as in the forceps figured by Mursinna, that contrivance being absent in the Mursinna's forceps in the Museum of the College of Surgeons.

In respect to the actual year in which Osiander's forceps was invented or made public, that obstetrician, according to the "Appendix" added by J. W. Schlegel to his German translation of Mulder's Historia Forcipum et Vectium, which was published in 1798, had not up to that date spoken or written of any special forceps of his own design. He had already practised a method of coating the forceps, and presumably other obstetric instruments, with india-rubber. Comparing the date of Schlegel's statement with Mursinna's reference to Osiander's instrument in 1803, it would appear that Osiander's special forceps must have been devised, or at least made known by the inventor in the course of the five intervening years."

With regard to the origin of the Osiander Lock, Doran observes as follows:—

"Dr. Edward Martin in a pamphlet entitled *Die Gebaranstalt und die Gebartshulflichen Kliniken der Universitat Jena*, figures (p. 74 and pl. ii fig. 1) some old forceps preserved in the museum attached to the Lying-in Hospital formerly in the possession of

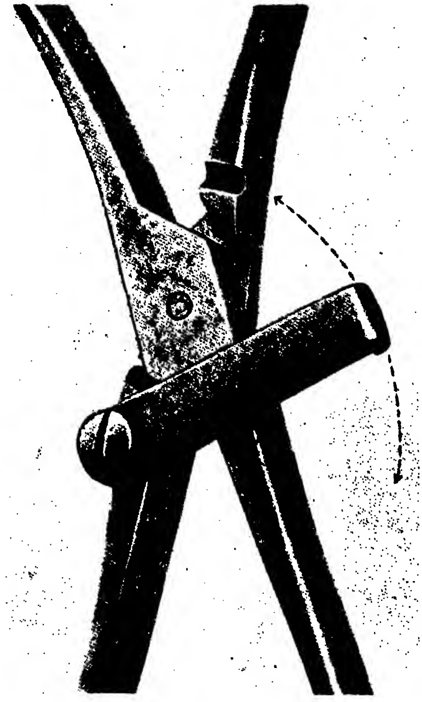


FIG. 325.
Lock of Mursinna's forceps. The block-lock is rotated downwards exposing the notch in the left blade designed to receive its incurved end and the pin in the left blade fitting into the hole in the right or female blade.
(Doran).

FIG. 326.
Lock as figured in Mursinna's original plate. The block-lock bears a small thumb-piece to fix it in the groove in the left blade and both handles are grooved to allow of the rotation downwards of the block-lock.
(Doran).

E. Martin's predecessor, J. G. Stark. One instrument is described by Martin as without doubt one of the oldest type of forceps but its inventor has been forgotten. It is represented

as a typical heavy solid steel French forceps with unfenestrated blade bearing a wide cephalic curve and the handles are turned up at their extremities. The lock at first sight appears almost identical with Osiander's. There is a pin which fits into a hole in the opposite limb. But the pin has a broad, flattened head and the lock is not closed by the bolt-lock revolving on a screw. There is a separate piece of metal, a sliding bar which bears a hole prolonged into a slot. The head of the pin is passed through the hole and the bar slid upwards, so as to make fast the lock. Osiander knew Stark and contributed to his journal. The contrivance here described may have suggested the Osiander lock, which in that case would be a simplification as the bolt-lock attached to the forceps by a screw did not require to be fixed on and taken off whenever the forceps was employed. Mulder does not figure any forceps with the sliding bar or with Osiander's bolt-lock in his "*Historia Forcipum.*".

1800. Eckard.

Eckard's forceps possess a special arrangement by which the cephalic curve can adapt itself to the head by variation brought about by backward and forward movement of a wedge-shaped piece of wood fixed to the inner side of the handles by means of a spring. (Fig. 282).

1800. Mursinna.

Mursinna's forceps is a big heavy instrument with fenestrated blades and is almost similar to that of Pean. It only differs from the other in its articulation which is that of Osiander. (Neues Journal fur die Chirurgie and Geburtshulfe; 1803 pp. 135 and plate I.).

Doran gives the following account of Mursinna's forceps from the latter's original description of his forceps in *Neues Journal.* "His forceps is largely modelled after Levret's instrument but he made it longer and improved the blades and handle. It measures two inches longer than Levret's and is therefore, easier to apply to the head at the brim. The blades are fenestrated but their inner surfaces are well rounded off,

without prominent borders and are made perfectly smooth so as to press evenly on the foetal head. The handles are longer than Levret's and almost straight, so that they may be firmly and comfortably grasped without fear of dangerous compression of the foetal head. Lastly Mursinna states clearly that the lock is adopted from Osiander's forceps for he had found that Obstetrician's joint and block-lock were easier of adjustment and firmer and on that account more fit for their purpose, than all the other locks of other forceps that he knew of. Yet Mursinna, unlike Osiander, retained the fenestræ." (See Topp).

Doran studied a sample of Mursinna's forceps in the Museum of College of Surgeons and gave the following description. "It is a very powerful forceps of the Levret type. Each limb is forged out of one piece of steel. The left bears a pin in the depressed portion of the lock, and a screw is fixed below the lock forming an axle on which revolves a radial block-lock 2½ in. (6.35 cm.) in length. Immediately above the lock is a deep groove made to receive the free end of the block-lock. The right blade is slightly wider in its shank at this point, in order to check the bolt and a hole in its lock portion receives the pin in the left limb. When the block-lock is fixed in the groove, the lock is complete, whilst when it is rotated downwards, the blades can be detached. The handles are flattened laterally, not rounded and perfectly smooth and their ends are rectangular. The blades bear a strong pelvic curve. The lowermost limits of the fenestræ show evidence of a brazing, probably for traction purposes. The maker's name "Gribel" is cut into the left blade.

The weight of this forceps is 2 lbs. (908 gram.); its length 18 in. (45.7 cm.); the length of the blades 9 in. (22.8 cm.); their breadth 1¾ in. (4.4 cm.). The greatest breadth across the blades is 2⅗ in. (6.6 cm.) and the distance between their tips when closed ⅝ in. 1.7 cm.). The length of the fenestræ is 6¾ in. (17.1 cm.) and their breadth ¾ in. or nearly 2 cm."

Doran compares Mursinna's original description of his forceps with the sample in the College Museum. The college sample "is simplified from Mursinna's original where the block-lock bore a small thumb-piece and both handles were notched

above the lock so as to allow the incurved end of the block-lock to pass over them." "The original of this instrument is preservéd in the Kaiser Wilhelm Akademie fur den Militararzte Bildungswesen, Berlin, where Mursinna taught when the Academy was known as the Papiniere-Schule for Militarartze." (See Doran's descriptive Catalogue, p. 18.)

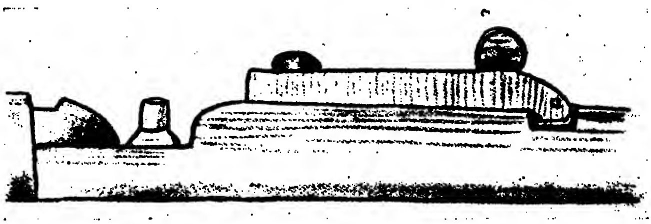


FIG. 327.
Portion of left limb of Mursinna's forceps showing the pin in the lock which is identical with the pin in the college sample and the block rotated downwards with its incurved free end lying in a groove in the handle, fixed by the thumb-piece. (Doran).

Mursinna represents his forceps as of the natural size, which I find on measurement to be 17 inches (43.18 cm.), being one inch shorter than the College specimen. The blades, in one figure, are closed and the swing block-lock, fixed by a screw on the handle of the left or male blade is represented with its incurved free end lying in a notch on the left blade above the lock. This is the same mechanism as in the College specimen. The male and female, or right blade, are also figured separately. The pin in the left blade is identical with that in the College specimen. On the other hand Mursinna figures the block-lock with a small thumb-piece to fix it in the groove in the blade. Most probably this contrivance was found to be superfluous and therefore was omitted in the College specimen. There is also a notch in each handle below the lock to allow of the passage of the block-lock over the handles, as is shown in the tracing which I have taken from Mursinna's plate, where it is represented as fixed into the notch in the left handle. These notches in the handles, also represented in Kilian's Armamen-

tarium Lucinae Novum (Pl. xxxiv) are omitted in the College sample, so it is clear that they ultimately proved superfluous. The inventor or his pupils probably found that the blades could be disarticulated and packed without them. The handles have rectangular ends as in the College forceps, but both ends could be unscrewed. The handles are rounded and seem rather more slender than in the College instrument. Kilian (loc. cit.) represents a second forceps marked "Mursinna," with very solid handles, flattened laterally, as in the College forceps, but the lock is a button-screw of the older French type, the instrument being a modified, lightened "Levret." Mursinna, in his account of his forceps here quoted, admits that it was largely modelled after Levret's instrument. The sample in the College is transitional. Its lock is of the Osiander type as in Mursinna's "improved" forceps, its handles are solid and flattened laterally, as in Kilian's second forceps marked "Mursinna." I can find no notice of the second instrument in Mursinna's works, where as has been shown he states in full how he followed Levret but adopted Osiander's lock in his "improved" forceps. Hence we may infer that this block-lock forceps was an improvement on an earlier instrument of his own, little if at all modified from Levret's. On the other hand it is just possible he found that the Osiander-lock was inconvenient and reverted to Levret's type of forceps." (Figs. 318, 319).

Carl Ludwig Mursinna was a very remarkable man, although Ingerslev makes no mention of him in his Geburtszange, whilst all that is recorded about him in Siebold's Geschichte der Geburtshulfe is the unfortunate fact that he performed symphyseotomy once but with a fatal result. The child was dead and was extracted with the forceps, and the mother died on the same day. The operation was performed in November 1815, and the operator did not neglect to publish the case.

Mursinna in the course of his long life went through varied experiences in other fields, especially battle fields although he gained deserved distinction as an obstetrician. He was an entirely self-made and self-taught man, an "Autodidact" as the Germans say. He was blessed with a highly robust constitution so that in his old age he served in the field as an army surgeon

throughout the terrible Jena campaign in 1806, and was once more in the field in 1811; though he had served as a surgeon in the seven years' war. As late as 1815 he actively superintended the case of the wounded sent to Berlin in the Waterloo campaign, and as above related he likewise performed a symphyseotomy.

Mursinna began life as a barber-surgeon in his native town of Stopl, Pomerania. After receiving instruction as an apprentice to a municipal medical officer in the port of Colberg, he set out for the field in 1760. Already Frederick the Great's reverses had been retrieved and Mursinna returned to civil practice with the victorious army of his country in 1763, evidently girt with professional laurels of his own. By 1775 he was medical officer to the Charite, Berlin, where he practised obstetrics as well as medicine and civil surgery. The war of the Bavarian Succession called him once more to the field in 1778. In 1780 a grave epidemic of dysentery occurred in Westphalia; Mursinna had become by this date a man of some importance, as the authorities sent him down to that province and he published a report according to their request.

Returning to Berlin, he took not only to hospital and private practice but also to active literary work, continued through the days of the French Revolution, and the ruin deliverance and triumph of his own country. By 1782 some medical and surgical observations appeared, but he must have had already by that date much experience in obstetrics, for in 1784 his Abhandlungen von der Krankheiten der Schwangeren der Gebarenden, Wochnerinnen und Saughlinge was published and went through a second edition. It was a work of considerable merit and is to be found in some medical libraries in London. In 1787 Mursinna was made Professor of Surgery and General Surgeon. While he was doing obstetrical work and amputations, he likewise undertook ophthalmic surgery, performing in forty years 908 cataract operations with, it is recorded, only 41 complete failures. In 1795 he once more went to the field of battle, the Prussian army being engaged in a campaign in Poland.

From Poland, Mursinna returned to Berlin. He took to the pen again, and was not recognised as a great operator and

obstetrician. Hitherto, at least in the works above mentioned, he wrote nothing about the use of the forceps. But in 1801 he started his Journal, and in 1803 published in its pages the account of his own forceps which is reproduced in this article. The Journal, some volumes only of which are preserved in the library of the College of Surgeons, ran from 1801 to 1815, but was suspended during the war in 1806-1807. Mursinna held the appointment of surgeon to the Papiniere-Schule fur Militararzte, now the Kaiser Wilhelm-Akademie fur den Militararzte Bildungswesen, where a sample of his forceps is still preserved. Mursinna also contributed to several other serials, especially to Stark's Archiv. He was very busy in the field during the Jena campaign. His jubilee of fifty years' service was kept in 1811, and his pupils greeted him with enthusiasm on that occasion, for he was a good teacher and an eloquent speaker, his annual addresses at the Papiniere in 1804, 1809 and 1811 exciting great interest. Mursinna, by 1813, was too old to go to the field, but was active in Berlin. He did not resign his office of Surgeon-Director to the Charite until 1818 and he lectured until 1820. Mursinna died three years later, at the age of 89. His colleagues apparently, and his pupils more decidedly, admitted that he always taught common-sense and condemned quack doctrines and over-confidence in any particular teacher. Gurlt and Hirsch (Biographisches Lexicon der hervorragenden Aerzte alter Zeiten und Volker) gave the date of Mursinna's birth as December 17, 1744 but make him out as .89 years old at his death in May, 1823.

Ould.

(Continued from page 160).

Fielding Ould was born in Galway, Ireland in 1710. He studied in Paris, probably for two years, under Gregoire and settled in Dublin about the year 1736 or 1737. On August 16, 1738, he was admitted a licentiate in Midwifery of the College of Physicians, Dublin. The College of Physicians, on being requested by Trinity College to examine Fielding Ould, refused to do so on the ground that the practice of midwifery was

derogatory to the dignity of the profession of medicine. Trinity College thereupon dispensed with its assistance and conferred the degree of M. D. upon Ould in 1761. A quarrel thus arose between Trinity College and the College of Physicians; but the disabilities imposed upon the men-midwives in Ireland were in a short time removed and Ould had the satisfaction of being admitted a licentiate in Medicine of the College of Physicians in 1785. In 1742 appeared "A Treatise in Midwifery in Three Parts by Fielding Ould, Man-midwife;" this was reprinted in 1748. In 1759 Ould was appointed Master of the Rotunda Lying-in Hospital, Dublin, in succession to Dr. Mosse its founder and first Master. In the same year he received a knighthood.

Fielding Ould acquired a very extensive practice amongst the upper classes and is said to have brought into the world Arthur Wesley (Wellesley), afterwards Duke of Wellington. He continued to practise until the day of his death, November 29, 1789, which occurred at the age of 79, as the result of an attack of apoplexy a few moments after delivering a patient.

The family of Fielding Ould has continued in the direct male line to the present day for seven generations.

SECTION V.

NINETEENTH CENTURY.

(FIRST HALF).

1802. Brunninghausen.

Brunninghausen, a Surgeon of Wurtzbourg, following the ideas of Levret and Smellie, brought about (in the mode of articulation, by notching adopted by the latter) an important modification, which was taken up again by practically all the German accoucheurs. He accomplished this by supplying the lower branch with a pivot, surmounted by a flat top and the upper branch with a groove, to fit into the collar of the pivot-bolt. The articulation was fairly fixed and stable. Brunninghausen also made the fenestra narrower and the blades deeper. The forceps resembles that of Busch and is about 15 inches long. The pelvic curvature commences suddenly. The fenestra are about 2½ inches long. (See fig. 315).

1804. Siebold.

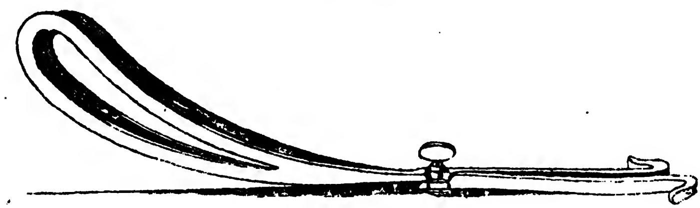
One of the branches of this forceps is furnished with a lateral groove, forming three parts of a circle. It is not necessary to raise the female branch to effect articulation. This can be accomplished by merely bringing the two branches into contact and making a screw-like movement. Its peculiarity is in the hinge. It differs from the mortise and pivot of Levret's, in that the mortise is not pierced in the centre of the female blade, but is formed as a hollow on one side so that it is not necessary to raise the female blade to insert the pivot or tenon but simply to bring them together so that the pivot enters the mortise, where it is fixed by a screw movement.

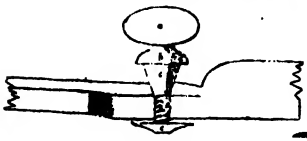
William P. Dewees in his book "A compendious system of Midwifery Tenth Edition, published by Lea and Blanchard, Philadelphia, 1843, p. 621," gives an illustration of the forceps of Professor Siebold and in the explanation of the plate says: "I have been favoured by the politeness of Dr. Eberle, with a

sight of Professor Siebold's forceps. In their general form and size they differ but little from the forceps of Baudelocque; they are rather longer in the clams and a little more curved as will be seen by examining the plates. What I value in them is their very ingenious mode of locking: I am persuaded this has a decided advantage."

E. C. J. von Siebold in his book "Lehrbuch der Geburtshulfe" published in Braunschweig, 1854, gives on p. 280 an illustration of El. *v*. Siebold's forceps. In discussing the subject of the choice of a good forceps, he begins by stating that it is impossible to recommend an instrument which includes the best features in all its component parts. He then describes what should be the qualities of a good forceps, alluding to what he considers the best feature of a component part in a particular forceps; *viz.*, the blade of Levret, lock of Smellie and Brunninghausen and the handle of El. *v*. Siebold. The handle is covered with wood.

FIG. 328.





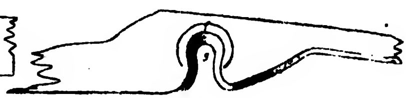


FIG. 329. FIG. 330.

FIG. 328.—Forceps of Professor Siebold, united by the screw shown in fig. 329 and reduced to ¼ the proper size. The turned extremities of the handles serve as blunt hooks.

FIG. 329.—Shows the screw which serves to unite the blades.

FIG. 330.—Shows the countersink for receiving the shoulder of the screw. (From Dewees).

It should be noted, however, that Dewees considered the lock as ingenious and illustrated a forceps said to be of Professor Siebold. (See figs. 328-330). The handles of the

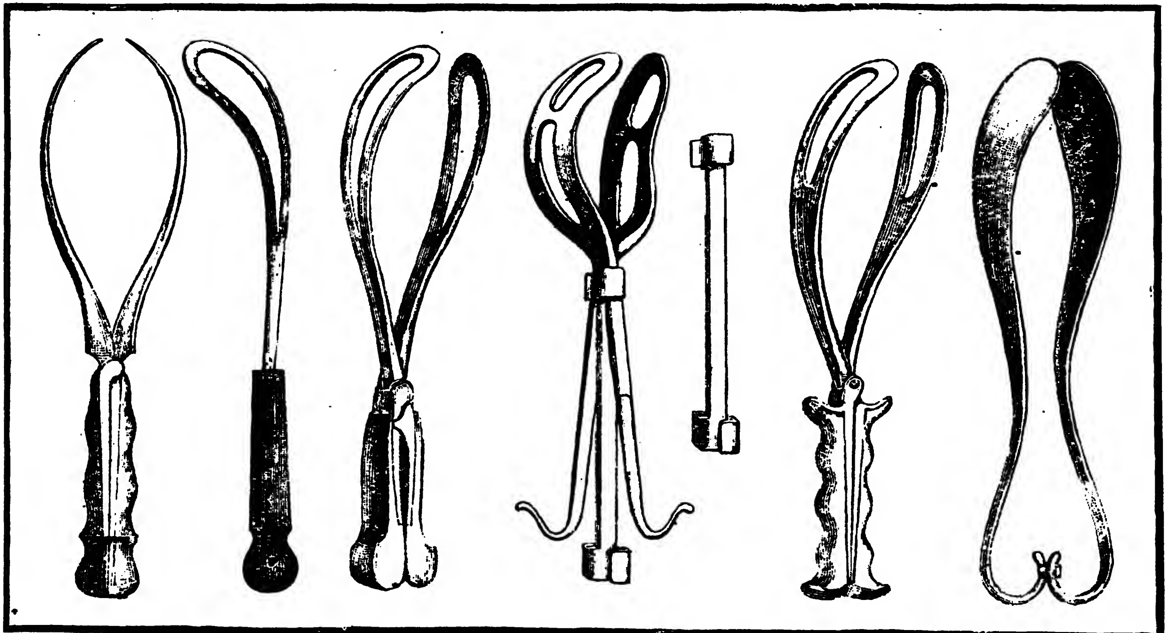


FIG. 331 Joerg. 332 FIG 333 Wigand. FIG. 334 Veit Karl. 335 FIG. 336 Muller. FIG. 337 Assalini.

forceps illustrated, are not covered with wood, as is the case in the illustrations in Kilian's Armamentarium and E. C. J. von Siebold's book. Evidently there has been some mistake in Dewees' book. (See fig. 317).

1804. Herbodlt.

F. D. Mayer published a description of the obstetrical forceps of J. D. Herbodlt in Phila M. & Phys. J. 1804-05, i. pt. 2, 144, and Kymmel a.a. O. p. 25 Tab iii. 8 and 9. Neither the description nor the diagram is available.

1805. Froriep.

Lud. Fried *v.* Froriep, in his book "Handbuch der Geburtshulfe published in Weimar in 1822, makes no mention of his forceps but mentions in para 461, eight points which a good forceps should possess. He also gives a classification of forceps which is given in a subsequent section. An illustration of his forceps is given in Kilian's Armamentarium. (See fig. 320).

1805. Delpech.

Delpech describes a forceps invented by a gentleman named Lacroix, a cutler of Toulouse. The instrument was uncrossed, and the articulation was very simple, being effected by one branch placed on the other with a screw traversing them. (See fig. 323).

1805. Uytterhoven.

Uytterhoven chief surgeon of St. Johns Hospital of Brussels, invented an antero-posterior forceps, one branch of which ought to be applied against the promontory of the sacrum and the other against the symphysis pubis.

Poullet says:—"No one seems to have used this instrument on the living. The construction of the instrument is based purely on theory. The instrument represents an useful idea, if it could be applied:—the compression of the head by the

forceps only in the antero-posterior direction, coincident with compression exerted in the pelvis. (See fig. 338).

FIG. 338.
Antero-posterior asymmetric forceps of Uytterhoven.
(From Witkowski).

1806. Fries.

A description of this forceps appeared in Lucina, Leipz, 1806 iii, 321. (See fig. 321).

1807. Lauverjat.

Theobald Etienne Lauverjat's forceps is illustrated in Witkowski's' L'Arsenal obstetrical (See fig. 339). It appears to be a massive and powerful instrument with screw arrange-

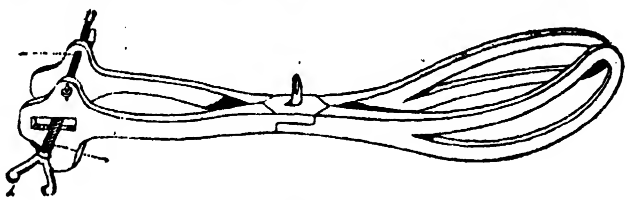


FIG. 339.
Lauverjat's Forceps.
(Witkowski).

ment at the end of the handles, evidently for purposes of compression. Its utility as a conservative instrument is very doubtful. No description is available. (See in G. W. Stein d. J. Annalen, etc. 1808, Stck. 1, p. 29).

1807. Jorg.

It is practically Boer's instrument, made narrower and the fenestrum towards the handle made wider. The handle and the blade up to the fenestrum in Boer's forceps are covered with

leather and harbours dirt. The leather covering has been done away with and undulatory handles have been provided. (See fig. 331).

1810. Muller.

Fr. A. Muller's forceps is referred to in Bell's Lehrbegriff der Wundarzneikunde, a.d. Engl. Ubers. Leipz, 1810, S. 390: in Kymmel a.a. O. Tab. IV, 7—11 and in Busch a.a. O. Fig. 349. (See fig. 336).

1811. Assalini.

The Italian obstetrician, Paolo Assilini of Mailand constructed a new parallel forceps. The following description of the sample in the museum of the Royal College of Surgeons of England, is copied from Doran's Catalogue, p. 16.

"Entirely metal, blades not crossed, handles incurved at lower extremity, forming hooks which face each other and are connected by a tenon and mortise. The handles are file-cut outside and nowhere in contact. Blades straight, fenestrated, wide curve, no distinct shanks; inner surfaces flat, borders hardly levelled.

Assalini's is the only forceps that has ever come into fairly general use. Rathlaw (Mulder, "Historia Forcipum" p. 31 and pl. ii, fig. 15), Schlichting (ibid, p. 32 and pl. iii, fig. 16), Thenance (Kilian's "Armamentarium" fig. 573) designed forceps with the same feature; in Mondote's forceps and Mattei's forceps and Mattei's "leniceps," as well as in Vacher's and Draper's forceps and Hamon's "retroceps," the blades were fitted to a transverse bar which formed the handle. Mattei's and Mondotte's instruments are described and figured in the Catal. Obstet. Soc. 1866, pp. 96, 98 and figs. 76, 77 and 79. De Wind's forceps (Mulder's "Historia" p. 41 and pl. iii. figs. 11 and 12) has no joint at all. Assalini's forceps was originally made with solid spoon-like blades (Kilian's "Armamentarium" pl. XXV) the later patterns being fenestrated. (See fig. 337).

The original drawing is pl. in Gervasoni's "Su L' Uso de. nuovi stromenti di Ostetricia del Cavalieri Prof. Assalini" 1811;

and in the same year the same drawing also appeared in Assalini's "Nouvi stromenti de Ostetricia e loro uso" pl. i, fig. 1."

For measurements see Appendix.

1812. James.

Robert P. Harris of Philadelphia read before the Philadelphia Obstetrical Society on March 2, 1871, a paper* on the "History of a pair of Obstetrical forceps sixty years old," which is reproduced below.

"As an evidence of the advances made during the present century in obstetric instruction and practice, I bring before you this evening a pair of forceps made in Philadelphia about sixty years ago, and first brought into use in the year 1812, by a

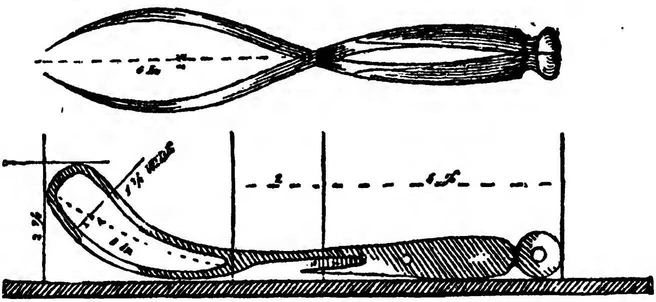


FIG. 340.
James' Forceps.
(From Amer. J. Obs.).

graduate of the University of Pennsylvania, just then commencing to practise his profession in Great Valley, Chester County, in this State. These forceps are of the short variety, slightly curved in the blades, have wood-mounted handles, narrow loop-shaped fenestra, without any beveling to fit the cranial convexity, and are better adapted for making compression than gentle traction, the distance between the blades being but $2\frac{1}{2}$ inches. Fortunately, the handles give only a leverage of $5\frac{1}{8}$ inches, or square-edged fenestra might be made to lop off a

*American Journal of Obstetrics, Vol. IV, 1871, p. 55.

portion of the child's ear. At the date mentioned, the obstetrical practice of the region referred to was mainly in the hands of two physicians about sixty years old, who had never used the forceps, and were in the habit of resorting to Smellie's scissors and the crotchet in all cases where the fœtal head became obstructed in the pelvis. The introduction of an instrument by the use of which these death-dealing tools might be avoided, worked a revolution in the practice, and was the means of getting the young M. D. rapidly into business.

Prior to the year 1810, when Dr. Thomas C. James was elected Professor of Obstetrics in the University of Pennsylvania, there was no separate chair for this branch of medicine in the Institution, a few lectures only being upon it in each winter by the Professor of Anatomy, which it was optional with the student to attend or not as he saw fit; and even when the branch was separated from that of anatomy, it was expressly stipulated that it should not be necessary, in order to obtain the degree of Doctor of Medicine, that the student attend the lectures upon Midwifery.

Such, however, was the success of Dr. James as a lecturer, that in 1831 his chair rose to an equality with the other branches of the College; he was chosen a member of the Faculty, and a preparation in obstetrics made obligatory upon every graduate. It was during this period of Dr. James' probation that the hero of the forceps obtained the knowledge which laid the foundation of his success as an obstetrician. Soon after he opened office, he had the good fortune to be called to a case of difficult labor, in which he used his instruments and delivered the woman of a living child. This was soon noised abroad, and when another similar one occurred in the practice of one of the before-mentioned sexagenarians, who decided, in consultation with his contemporary, to destroy and deliver the child in their accustomed way, the women in attendance put their veto upon their procedure, and demanded that "the boy," as they sneeringly styled him (for he was but twenty years old), should be called in consultation. The young Doctor was very reluctantly summoned, used his forceps as in the former instance, and rapidly rose in the estimation of the community, securing in

time as large a practice as it was possible for him to attend to, it being especially extensive in surgery and obstetrics, but particularly the latter, amounting to many hundreds of cases during the twenty-two years of his country residence.

One of the most prominent and honored physicians of Pennsylvania owes his existence to-day to this pair of forceps, and has carried their mark upon his head for nearly half a century. He was the first child of his mother, and her labor was the most difficult one in which these instruments were ever successfully used. She bore several children subsequently without special difficulty, and still lives at the age of 81, probably the oldest surviving patient in whom they were employed.

In 1834, another Chester County Doctor, a student of the former, was furnished by his preceptor with his old forceps, and they continued their round of usefulness a decade longer, until the latter's death, when they were purchased as a curiosity, put into perfect order, and have been kept as such ever since. Their history is rather more pleasing to contemplate than that of a pair now in this city, which cost a former owner $5,000 damages in a suit for malpractice; after which he changed his locality and started anew with a pair of "Hodge's." The discarded pair have evidently been modelled after Davis' short forceps, but have very broad fenestra, wide flat-edged blades, and are so badly shaped that they might readily do serious mischief in the hands of an inexperienced operator. They tore the vagina of a woman and lacerated her perineum to such a degree that she died in consequence; hence the suit by her husband for malpractice, and conviction by the jury. The man who made such a murderous weapon should have been prosecuted for furnishing it to a young beginner, and made to bear a portion of the costs. With a pair of Dr. Hodge's in his possession, and the dearly bought experience he has had, he should be able to avoid all such mishaps in the future, and rise to eminence as an obstetrical operator.

I will here state, that my hero of the forceps was for twenty-seven years engaged in the practice of medicine in this city, until his death in 1861, and that hundreds now living enjoyed the benefit of his obstetrical instruction, among whom

are many in the foremost rank of the profession. Those who recognize the picture are welcome to the knowledge, and will perhaps understand the reasons for my mentioning no names.",

1812. Wigand.

Justus Heinrich Wigand was born in Revel in Esthonia on 13th September, 1769, and died on 10th February, 1817. The mode of articulation adopted by him for his forceps is ingenious. (See fig. 333).

1812. Veit Karl.

Karl's forceps has been constructed on new principle. Each blade has two perforations, the curvature near the edge is much more pronounced than in the head extractor of Levret. The work of the handles is performed by means of a mechanism, which is quite original although it has not been adopted by others. (See fig. 334).

1816. Flamant.

R. P. Flamant, Professor of Surgery and Obstetrics in Strassburg, constructed a forceps, references to which have been made in (1) his "Memoire pratique sur le forceps." Strasb., 1816. (2) Dictionnaire des sciences med. Paris 1816. Tome xvi Art. forceps. (3) Toussaint, S. Consideratimus generales sur les accouchmens particulierement sur l'emploi du forceps francais dans la pratique de cet art. strasb., 1822. (4) Kymmel a.a.O. p. 36 Tab v. Fig. 6—9. (5) Busch a.a.O. Fig. 357. (See. fig. 343). Flamant died in October 1833.

1817. Brulatour.

On 6th Sept., 1817, Brulatour Professor of Surgery at Bourdeaux announced at the Medical School of that city, a new forceps constructed by him. It was unfortunately very complicated, the author having in view, above all, the idea of making it useful, in all the various cases that might arise. The instrument is articulated somewhat like Levret's but to

KILIAN'S ARMAMENTARIUM.

TAB: XXVI.

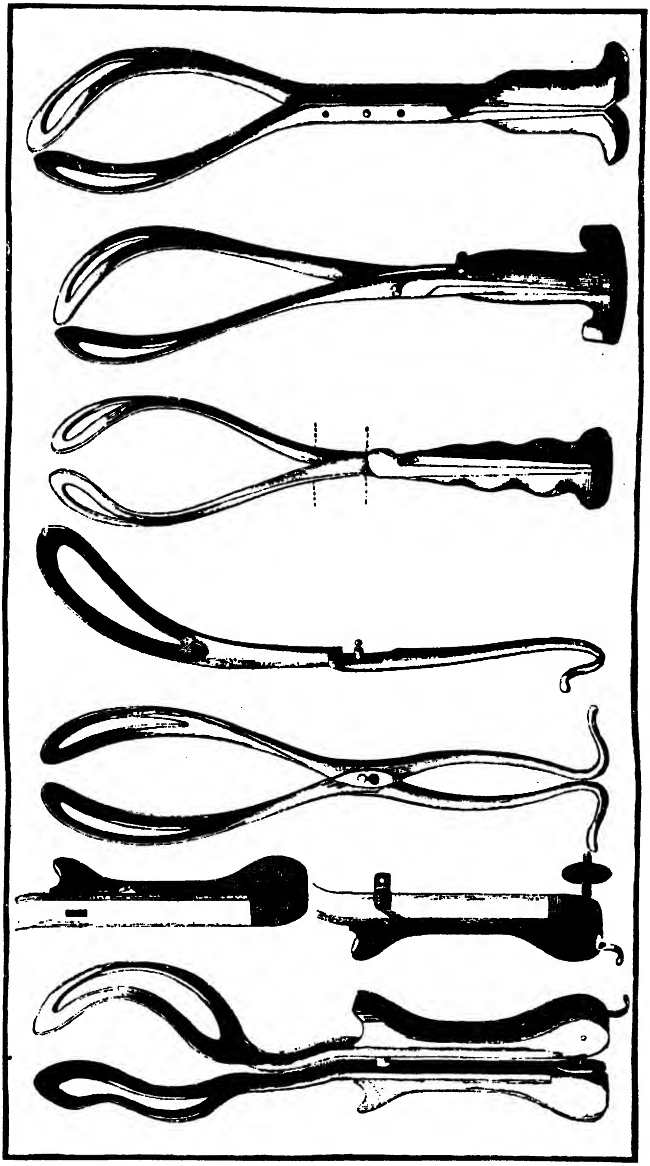


FIG. 341 Uhthoff. 342 FIG. 343 Flamant. 344 FIG. 345 Carus. FIG. 346 Ritgen 347

make it more firm the handles are tightened by means of a string passing through an opening made for the purpose and also by a pressure forceps. There is also a graduated scale in the handle, for measuring accurately the degree of separation of the blades. Brulatour had three sets of blades which fitted the same handles by means of a dove-tail arrangement. (See fig. 348).

1820. Carus.

Carl Gustav Carus was Professor of Midwifery in the Medico--Chirurgical Academy of Dresden and Director of K.

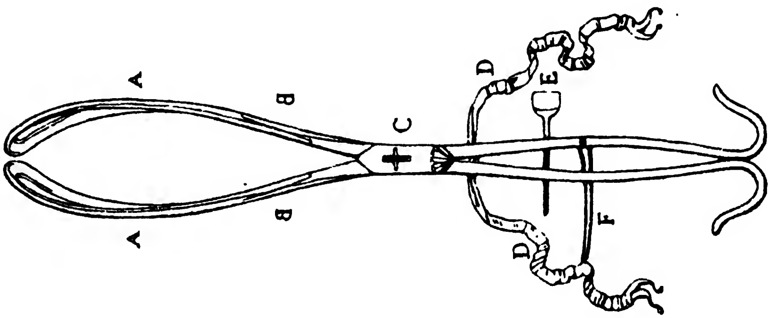


Fig. 348.
Brulatour's Forceps.

A. Blade. B. Junction of blade with handle by a dove-tail arrangement permitting the adaptation of different blades and hooks. C. Tablet over the articulation. D. Tape traversing the branches for facilitating traction. E. Pressure screw. F. Scale to show the degree of separation of the blades. (Witkowski).

Saxony Lying-in Hospital. He constructed a forceps which is referred to in (1) Carus Gynaekologie Bd. II s. 640: (2) Kymmel a.a. O. p. 40, Tab vi, fig. 1 and 2: and (3) Busch a.a.O. Fig. 358. (See fig. 345).

1820. Conquest.

Conquest was the Obstetric physician of London Lying-in Hospital. The original account of his forceps is given below.

"The *short forceps* which are submitted to the consideration of Accoucheurs, are characterised by the simplicity of their

mechanism and their easy adaptation to practical purposes. The fenestræ are so wide as to admit the protuberances of the parietal bones to pass through them by which two very important objects are secured. We are indebted to Dr. Haighton for this very important improvement in the short forceps; and this acknowledgment affords me peculiar pleasure, because it is impossible to mention the name of that truly respectable man without expressing sentiments of the highest respect for his character. But it will be perceived that the forceps in the appended engraving have much narrower shoulders and are less in all their dimensions (except in their length) than those known as Dr. Haightons." (See fig. 349).

Conquest proceeds to explain how the wide fenestræ in his forceps allow the prominences of the parietal bones to protrude through the blades. Thus bulk is diminished and there is less risk of damage to the soft parts. Then he explains the advantages of the perineal curve on the shanks at the handles.

"The *last*, although very far from the *least* peculiarity in these forceps, to which reference will be made, is the construction of the handle of the blade, which is usually applied last and uppermost."

Conquest then alludes to the difficulty of introduction of the upper blade and observes:—

"Accoucheurs alive to this circumstance, have long since had their levers made with reflecting or movable handles; and it is to the latter expedient that I am indebted for the suggestion, which led to the simple contrivance of a movable handle, by a screw, which is so clearly exhibited in the engraving; and there can be now no difficulty in introducing the upper blade of a short forceps directly over the vertex, without changing the position of the patient. After the blade is fixed, of course the handle is to be screwed on and the instrument used as any other."

Conquest also talks "of the long forceps" but does not state whether he had a special long forceps constructed after the design of his short instrument. The measurements of Conquest's forceps are—Length 11 in; length of blades 5 in. exclusive of the curve; greatest width 2⅛ in. where the fenestræ

are 1½ in. wide. The widest part between the opposite blades, "ought not to measure more than two inches and a half or five-eighths." The handles are 4¼ in.; each shank measures 2 in.

Doran* describes a sample of Conquest's jointed forceps, which is in the Loan collection of the R. C. S. The instrument belonged to a box of instruments, once the property of the City of London, Lying-in Hospital. Doran calls it a "rather odd-looking instrument,........... chiefly distinguished for its wide fenestræ and for the perineal curve on its shanks, whilst the screw arrangement allows of easy application of the upper blade to the fœtal head when the patient lies on her left side."

"The blades have no pelvic curve and their inner surfaces are quite flat. They have long shanks, with a marked perineal curve measuring 2 in (5 cm.) not taken along the curve. The handles have the usual palm-rest; there are no finger-rests but there is a slight shoulder on each side; the lock is of the English type. The limb bearing the left or lower blade is forged in one piece, and its handle is coated with ebony. The handle of the right or upper blade is made entirely of ebony and bears a metal top with a female screw placed there to receive a male screw in the corresponding blade." For measurements see appendix.

1820 (?) Stein (Junior).

He advocated the dynamic action of forceps as a principal factor and considered the mechanical action subsidiary. He made a "galvanic" pair of forceps with Zinc and Copper.

1820. Ritgen.

Ferd. Franz Aug. von Ritgen Professor of Midwifery in the University of Giefsen was born on 11 October, 1787 in Wulfen in the country of Salm-Salm. His forceps, with long and short blades is described in Gem. deutsche Ztschr, f. Geburtsk, Weimer, 1829, IV 401. Reference to his instrument

*Journal of Obs. & Gyn. of Br. Empire, Vol. XXIV, p. 201.

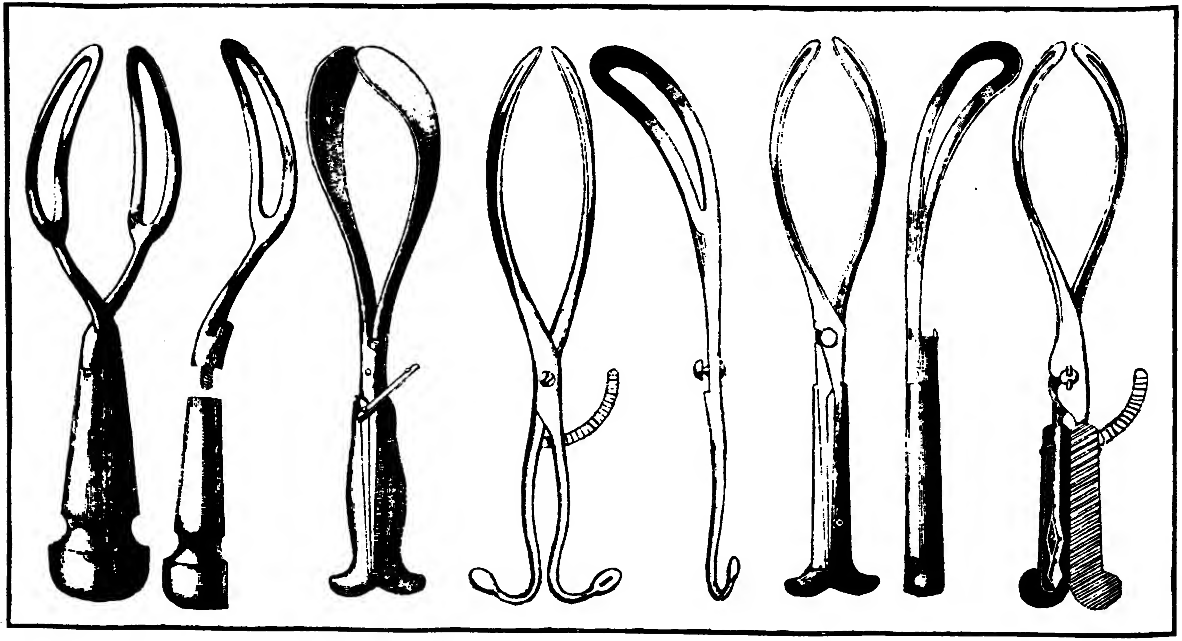


FIG. 349 350 Conquest. FIG. 351 Weissbrod. FIG. 352 353 Maygrier. FIG. 354 355 G. Salomon. FIG. 356 Guillon.

is also to be found in his "Anzeigen der mechanischen Hulfen bei Entbindungen, Leip. 1820: Kymmell a. a. O. p. 38. Tab. V fig. 15-18: Busch a. a. O. fig. 350, I. (See figs 346, 347).

1825. Weissbrod.

John. B. Weissbrod, Director of the Lying-in Hospital in Munich, constructed a forceps, the blades of which are of Osiander's type, non-fenestrated. The block-lock forms a replica of Osiander's second pattern but the handles are coated externally with wood and everted at the free end, a kind of compromise between the bulging palm-rest, so familiar a feature of English forceps and the curved or rectangular hooks of French instruments, as well as of Osiander's and Mursinna's. There is no flange or finger-rest and hardly any shoulder to the handle. (See fig. 351).

Doran* observes "time and the experience of later obstetricians has not favoured Osiander's and Mursinna's lock for it rapidly fell into disuse. Still it seemed to be an ingenious piece of mechanism which deserved rescue from oblivion."

1825. Davis.

David D. Davis Professor of Midwifery in the University of London and obstetric physician to the North London Hospital, constructed five different varieties of forceps, descriptions of which are given below.

I. Symmetrical Bladed forceps with jointed Right Blade.

This instrument† is also known as Davis's forceps with wide fenestræ. The author's description of his common forceps is quoted below.

"The instrument now to be described, while it presents perhaps the features of a more decided family resemblance to

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*Jour. Ob. Gyn. Br. Emp., Vol. XXIV, p. 10.

†Elements of Operative Midwifery; comprising a Description of certain New and Improved forceps for Assisting Difficult and Dangerous Labours; illustration by plates; with Cautionary Strictures on the Improper Use of Instruments, published in 1825, pp. 38—41 and 201 and plates I to V. and in Davis's "Principles and Practice of Obstetric Medicine",, 1836, p. 1099 and 1137.

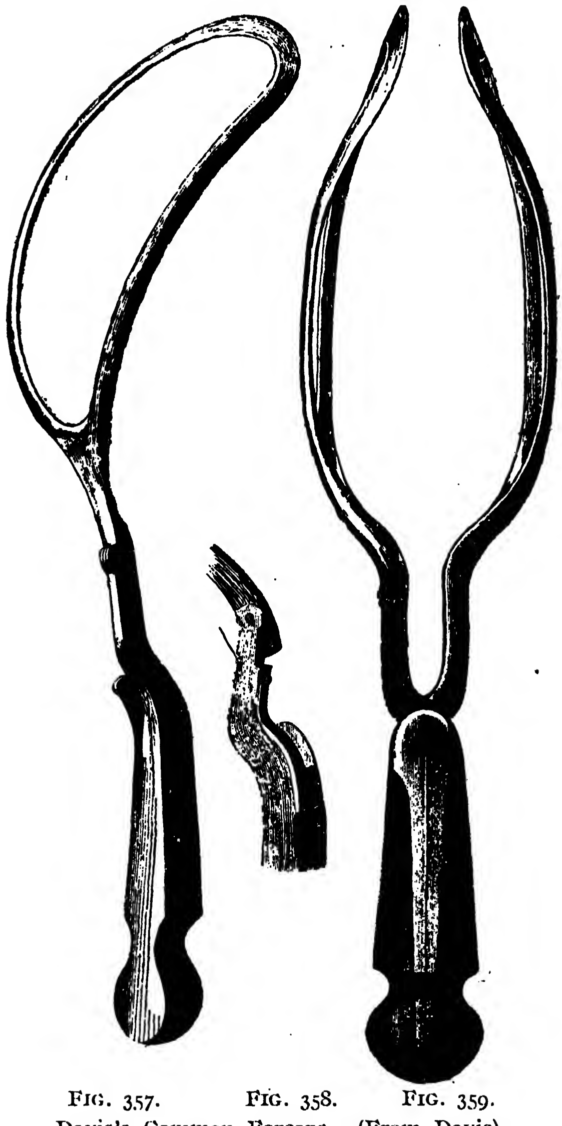

FIG. 357. FIG. 358. FIG. 359.

Davis's Common Forceps. (From Davis).

FIG. 357.—Right-hand blade made flexible at its shank by means of a joint shown separately in fig. 358.

FIG. 359.—Complete articulated forceps.

the common English forceps, will nevertheless be found to embrace some of the better properties of those of France and Germany. The length of this entire instrument is between 11½ in. and 12½ in. English measure, this difference being made to depend on the discretion of the possessor as to the length of the handles. The length of the blades, from the commencement of their separation at their shanks marked by a short transverse line plate XXXII fig. 1, to their respective points, the line of measure being taken between and equidistantly from each, is about 6½ in. or 6⅝ in. The length of their shanks, from the commencement of their separation at the line already mentioned to their point of crossing each other at the lock is 1⅜ in; and the length of the handles, including the lock, is about 4½ in, something more or less, at the owner's discretion.

The weight of a well-made pair of forceps of this construction should not exceed 13½ ozs. ; the excess over the weight respectively of those of Denman and Osborn depending upon the greater length and strength of the shanks. It will be observed that the blades are much broader than those of any other English forceps with the exception of Haighton's; and as far as the author knows, than those of any foreign specimens without exception. Without however, the amount of width here given to the fenestræ *viz.*, 1⅝ inch at their widest part, see pl. fig. 1, dotted line marked c.c. they will not be competent to receive any useful portion of the fœtal head within their frames, notwithstanding the assertions so universally made by authors to the contrary..................The blades of this instrument are not only broad and fenestrated like Haighton's; but they are much more hollowed out interiorly than those of any other forceps that the author has ever seen. ....

"The fœtal head being somewhat differently curved at different parts of its surface, it has been attempted to dispose of the curvature of different portions of the blades of the instrument accordingly ; so as to ensure, as much as possible, equal contact and equal pressure upon all parts of the head where the fangs or frames of the fenestræ ought to be in apposition to it......................... From the actual width of these fenestræ and narrowness of the frames surrounding them, the more

FIG. 360.
Davis's Forceps with blades of unequal breadth. The auxiliary blade represented as the right-hand branch, is very narrow compared with its broader counter-part and may be fenestrated or not. (Davis).

prominent parts of the head are allowed to escape through their apertures to some distance beyond them and indeed into full contact with considerable tracts of the vaginal parietes.

It being occasionally necessary that the child's head should be subjected to some compression that result is sufficiently provided for by an adequate strength which is given to the shanks and the metallic parts of the handles, as also to the posterior portions of the fangs. But these latter are gradually made thinner as they advance forward, so that towards the middle of the blade they do not exceed in thickness 1/12 inch.

This instrument, in common with Osborn's adopts the curve in the direction of the edges of the blades, as suggested by Levret. ....

It has been already stated, that the common English forceps are objectionable on account of the extremely inconvenient position of their locking parts. This inconvenience is completely obviated in the construction of the forceps which are here proposed, by adding about 1⅜ inch to the length of the shanks, of the common forceps. These shanks, after the crossing of the counter-parts of each branch at the lock, are carried forward towards their respective blades during the whole course of their lengthened part, in a parallel direction to each other and at a distance from each other of about ⅜ inch. By this parallel elongation of the shanks, the locking part is of course necessarily removed in the same proportion further back *i.e.*, towards the handle-end of the instrument. (See fig. 359).

The right-hand blade .... has been made flexible at its shank by a very simple contrivance. (See plate XXXII fig. 3). By means of this joint, the handle is made to bend outwardly, *i.e.*, in the direction of the convexity of its blade. Without laying any great stress upon this unimportant expedient, it is to be observed that it may add occasionally to the facility of introducing the right-hand branch of the instrument. It is an advantage however, if any, which can apply only to English practice .... where the custom prevails for women to be delivered in the position of lying on the left side." (See fig. 357, 358).

KILIAN'S ARMAMENTARIUM. TAB. XXIX.

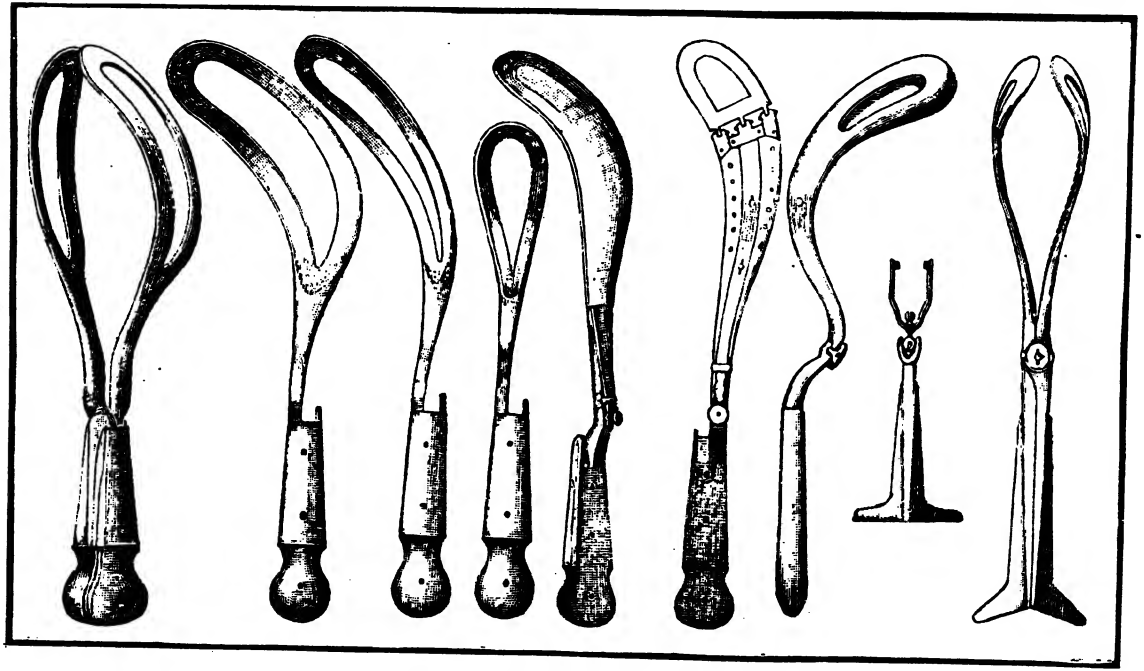

FIG. 361 362 363 Davis. 364 365 366 367 368 Th. Hermann. 369

II. Forceps with blades of unequal breadth.

"We have already seen how important it is to be able to embrace large portions of the fœtal head within the fenestræ of the forceps. On account, however, of particular conformations of the maternal pelvis or of certain inconvenient positions of the child's head, an instrument with two broad blades may not be at all times perfectly easily introduced. To meet the peculiar indications of cases of this kind, the reader will find in plate XXXV. fig. 1. (Fig 360 and 363) an useful modification of the obstetric forceps. The auxiliary blade represented as the right-hand branch is very narrow compared with its broader counterpart...... The auxiliary blade may be either fenestrated or not, to suit the taste of the possessor; and its shape differs essentially from that of one of the branches of Osborn's forceps, only in the length of the shanks."

III. Forceps with blades of Unequal length.

"..................... The author has furnished himself with a pair of forceps or rather with two pairs of this instrument, specially adapted to cases of the third and fourth positions of the fœtal head within the pelvis, *viz.*, the positions with the face directed to the right and left sides of the pelvis respectively. The blades of these instruments are of unequal length. The longer is intended to apply to the latero-frontal parts of the fœtal head and face, and is to be carried up in the direction of the anterior termination of one of the oblique diameters of the pelvis: while the shorter blade is to be carried up in the direction of the opposite termination of the same diameters, so as to correspond to one or the other, as the case may be, of the sacro-iliac junctions and applied to an occipito-lateral part of the fœtal head, immediately behind the ear. (See plate XXXVIII. fig. 2 & 3).

IV. A modification of a pair of Forceps, with blades of unequal length.

In plate XXXIV (fig. 364) is given a representation of another form of forceps, with blades of unequal length..........."

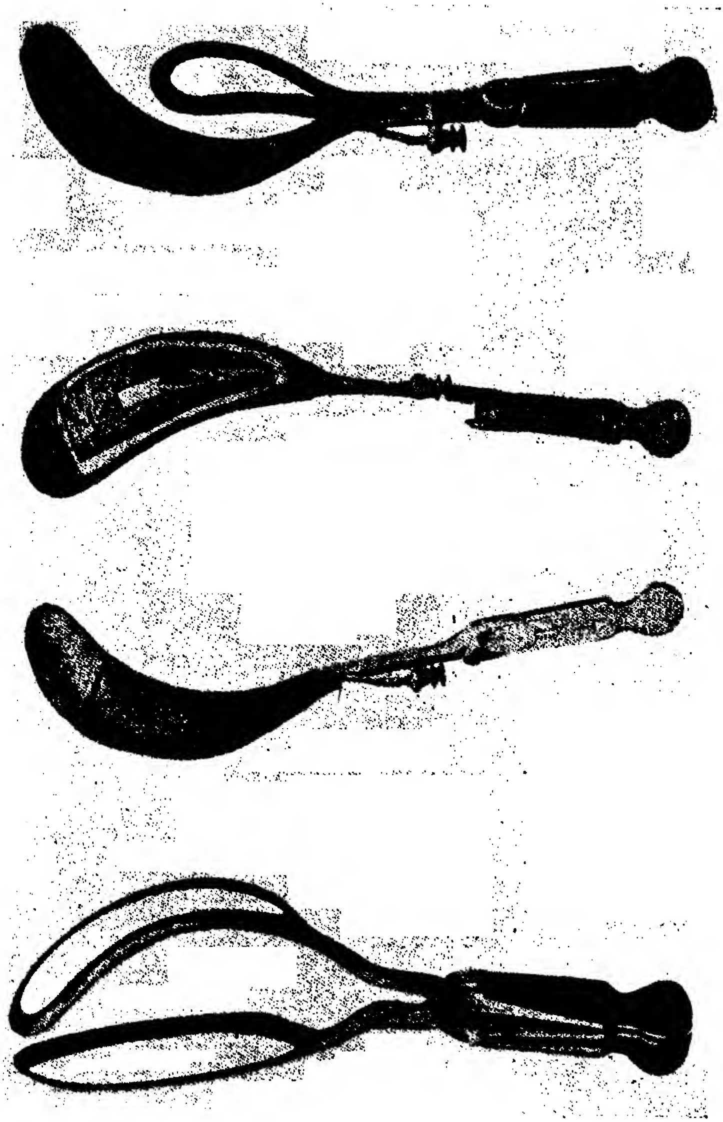

FIG 370
Davis (Symmetrical).

FIG. 371 FIG. 372
Davis (Asymmetrical).

FIG. 373
Davis (Asymmetrical with short fenestrated blade).

Loan Collection. R. C. S. (Doran).

A short blade has been adapted to correspond with, and chiefly for the purpose of acting as a fulcrum to, one of the broader blades of the common forceps. The small bladed instrument is not curved in the direction of its edges, so that it will act equally well with either counterpart of the broad-bladed forceps."

V. Of the Long Forceps.

"The author considers the old long forceps as decidedly unsuitable for the relief of cases of arrest of the fœtal head at the superior aperture of the pelvis, under the circumstances of either of its transverse positions. Accordingly he has to submit to the approbation and cautious trials of the profession, a modification of a pair of forceps which may be used under these circumstances with considerable effect. .... In plate XXXVI is represented a model of this instrument in actual application to the fœtal head, supposed to be arrested at the brim of the pelvis in a transverse position, the occiput being determined to the right and the forehead to the left of the mother. It consists of two counterparts of unequal length, as well as of different and unequal powers. The long one is covered with leather and lined with a padding of the softest flannel; a considerable part of its blade being intended to apply firmly to the face of the child. At the distance of about 1¾ inch from its extremity, the blade has a joint in it admitting a limited degree of flexion and extension. When this branch of the instrument is carried up to its proper destination, the jointed part of the blade will be found to correspond to the superior portions of the face. The movements of the part of the instrument anterior to the joint are made obedient to the will of the practitioner. The blade is to be passed up along the left side of the pelvis in the state of full extension. When distinctly felt to have passed over the great convexity of the forehead and ascertained by examination to be so far properly introduced, the anterior part of the blade is to be bent down and applied closely to the face; which is to be effected by moving the nut A upwards. This little contrivance is very

simple and its mechanism is well represented in pl. XXXVII fig. 3. (See fig. 366). The anterior portion of the blade is made capable of two degrees of flexion with the other parts, at the pleasure of the operator. In general it will be advisable to push up the nut to the highest catch, so as to produce the greater degree of flexion, which will give to the anterior part of the blade an ample purchase over the child's forehead and face. The shorter branch is then to be passed up along the right side of the pelvis and applied to the child's occiput, to act both as a fulcrum and an antagonist to the other. The power of this instrument is only partially that of a pair of forceps. There is here no coequal counterpressure applied to directly opposite parts of the head. It acts principally as an adductor; the attracting power being applied to a surface nearly opposite to the presenting part of the head. The short blade being applied to the occiput, the two branches of the forceps are then to be mutually adjusted at the lock.

The specimens of long forceps, here proposed being curved in the direction of the edges of the blades it is evident that the practitioner who might be induced to make trial of them would have to supply himself with two pairs *viz.*, one to apply under the circumstances of the last case and the other to apply correspondently to the face and occiput when respectively directed to the left and right sides of the pelvis. The forceps to be used in this case are therefore precisely the same sort of instrument as what has just been represented in pl. XXXVI and XXXVII only reversed as to the direction of its surfaces: the longer branch of the former being a right-hand and that of the latter being a left-hand blade.

Doran* describes accurately a sample, of David Davis symmetrical bladed forceps with wide fenestræ and jointed right blade which is in the Loan collection of the R. C. S.

The blades, unlike those in some other types invented by David Davis, are symmetrical. The left blade and handle are forged in one piece; the right blade as will be explained, is jointed and the lock is of the English type.

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*Jour. Ob. Gyn. Br. Emp., Vol. XXIV, p. 207.

The handles are coated with ebony and bear the usual palm-rest, but neither a finger-rest nor a shoulder. The shanks about 1 in. (2.5 cm.) long diverge at an angle of 45°; the joint lies in the right shank. This space between the shanks, originally appearing in Evans's (of Oswestry) and Aitken's forceps has ultimately been associated with the name of Simpson.

"The blades are much broader than those of any other forceps with the exception of Haighton's." We have seen that Conquest adopted Haighton's broad fenestræ. The blades are greatly hollowed out anteriorly .... The blades on their inner surface slope towards the border of the fenestræ so as to take up less space in the pelvis. The pelvic curve is marked. There is no perineal curve.

The circular joint in the shank of the right blade was fitted on so as to allow it to be placed at any angle. It could be fixed or released at will by means of a spring catch. In the sample in the Loan Collection this spring catch has been destroyed by rust and the blade was broken off during an attempt to bend it and it has been repaired without restoring the joint action. The joint was placed so that the blade could be bent outwards in the contrary direction to a folding vectis and David Davis believed that this expedient "may add occasionally to the facility of introducing the right branch."

Thus the joint was designed for much the same purpose as Conquest's screw handle."

"David Davis devised several other patterns of obstetric forceps to meet certain contingencies (figs. 9 and 10). The most remarkable of these instruments must be noted here, as one blade was jointed. The jointing was for a unique purpose, not for convenience in packing as in Freke's and Saxtorph's forceps, nor for allowing of the application of blades of different size as in Pajot's nor for facilitating the introduction of the upper blade as in Hamilton's Conquest's and the symmetrical bladed forceps, of Davis's design just described. Nor was the joint placed in the shank or in the upper part of the handle. The blade itself was transversely jointed near the tip to aid in the extraction of the head.................Another peculiarity about

this instrument is that there were two long blades, one for use when the face of the fœtus lay to the left and one for use when the face lay to the right."

"The sample in the Loan Collection is in good condition. I have cut away part of the leather cover of one long blade in order to show the whole of the mechanism described below."

The forceps (as in use, that is to say, with the short blade articulated to one long blade), weighs 1 lb. 4½ oz. (490 grams.).

The handles are coated with ebony and bear the usual palm-rest; there are no finger-rests, and only a shallow shoulder made by the metal covering the upper border of the ebony cover. The shanks of the two blades are both nearly 3 in. (7.6 cm.) long. The long blade, has a marked pelvic curve and is entirely coated with leather. The fenestra is filled in by the apparatus for flexing the upper part of the blade. The short blade has no pelvic curve and is coated with leather which does not cover the fenestra (fig. 10)."

These asymmetrical short forceps, as well as several other ingenious modifications are preserved in the Loan Collection. The whole series of David Davis's instruments was presented to the Obstetrical Society by Hall Davis, the son of the inventor.

The following descriptions are reproduced from Doran's descriptive catalogue.

(1) David Davis's Forceps with Narrow Fenestræ.

"Blades symmetrical and forged in one piece with handle. English lock."

"The handles are coated with ebony and shaped as in the previous instrument. The shanks are also similar, but neither is jointed. On their inner surface the blades slope towards the margin of the fenestræ. They are unusually broad blades and the greatest breadth between the blades is but 2½ in. Pelvic curve marked, no perineal curve. This instrument is not figured in Davis's work but each blade is very like that represented as being introduced into the pelvis in pl. iii. fig. 1. It seems identical with Haighton's forceps with narrow fenestræ (Radford's "Essays on Midwifery" pl. i. No. 2-A) but is unlike the type of forceps generally associated with the name of Haighton.

(2) David Davis's Asymmetrical Long Forceps for cases of Arrest of Fœtal Head in Transverse Position.

"Blades asymmetrical, forged in one piece with their handles but upper part of long blade jointed 2 in. (5 cm.) below its extremity. Two long blades each bearing a transverse hinge-joint near its upper end; and one short blade serving for either long blade. Handles coated with ebony, bear a palm-rest. English lock. The long blade has a marked pelvic curve and is entirely coated with leather. Its fenestra is occupied by the apparatus for flexing the upper part of the blade. The short blade has no pelvic curve; it is coated with leather which does not cover the fenestræ.

(3) David Davis's Short Blade for Use in Cases of Prolapsed Funis.

"Forged in one piece, handle lined with smooth ebony with palm-rest an inch above their extremities; English lock. Shank 1½ in (3.8 cm.) long. Blades with moderate cephalic curve, concave inside, sloping towards margin of fenestræ.

David Davis successfully used this blade combined with a longer one for the relief of advanced labours complicated with protrusion of the cord. ("Elements" pp. 167-168).

(4) David Davis's Oblique Forceps with Blades of Unequal Length.

"Blades not symmetrical, forged in one piece with handles as in D. Davis's forceps with narrow fenestræ, both blades have a pelvic curve but an unequal curvature."

The shanks are 1¾ in. (4.4 cm.) long, the inner face of the blades is level, not sloping towards the fenestræ. The blades are very uneven.

David Davis used these two forceps specially in the third and fourth positions of the vertex. (See David Davis "Elements" pp. 42-3 pl. vii, viii). The blades were covered with leather when in use.

1825. Radford.

Thomas Radford was born near Manchester in November, 1793, and died there in May, 1881, aged 88. He had his

medical education partly in Manchester, partly in Guy's and St. Thomas's Hospitals. At the age of 24 he became M.R.C.S. and L.S.A. and next year, *i.e.*, in 1818 he obtained the office of Surgeon to the Manchester and Salford Lying-in Hospital. He lectured on midwifery in two Manchester schools of medicine successively for many years. He published many papers and took always keen interest in all obstetrical proceedings. He was one of the first Vice-Presidents of the Obstetrical Society. He was an F.R.C.P. Edin. and F.R.C.S. England. In 1853, he made a gift of his valuable library and museum to St. Mary's Hospital, Manchester.

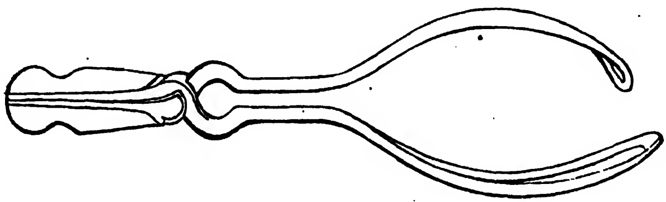

FIG. 374.
Radford's straight Long Forceps with blades of unequal length. (From Obs. Soc. Catalogue).

He constructed a long straight forceps, with one blade longer than the other, the long blade being passed over the face the short one over the occiput. The forceps is sufficiently long to be applied when the head is at the brim. "The shortness of the handles renders violent compression of the head, impossible. The oblong opening formed by the curve in the shank of each blade is for the purpose of passing a silk handkerchief through and will enable the practitioner, in addition to his hold of the handles, to use very powerful and effective force. The reverse position of the locks supersedes the necessity of all contrivances, such as screw or hinge, between the handle and the blade which (according to the usual construction, is placed on the upper side of the pelvis and is the one to be the last introduced. Whereas the position of the lock in this instrument requires that the upper blade (assuming the woman lies on the left side) should be first introduced." (Catalogue of Obstetrical Society of London p. 99).

The following description of a sample of Radford's Straight Long Forceps with Asymmetrical Blades, in the museum of R. C. S. is reproduced from Doran's Descriptive Catalogue.

"Each limb is forged out of one piece of metal, handles very short 3½ inches (8.8 cm.) lined outside with ebony; palm-rest, no flange or finger-rest or shoulder, English lock reversed. The blades bear shanks 3½ inches (8.87 cm.) long; with a wide finger-ring immediately above the lock.

Doran, in his Descriptive Catalogue, gives the following description of a sample of Radford's Long Curved Forceps with symmetrical Blades:—

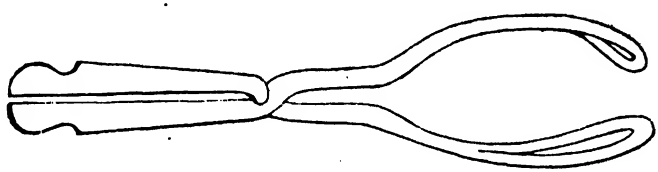

FIG. 375.
Radford's Long Curved Forceps with equal blades.
(From Obs. Soc. Catalogue).

"Each limb is forged out of a single piece of metal. When the lock (English type) is closed the handles, which are lined outside with ebony, do not lie in contact with each other.. No shoulder, nor flange or finger-rest. The shanks are 1½ inches (3.8 cm.) long, almost parallel, but with no space for the forefinger. Blades with pelvic curve. The object of the parallel shanks is to prevent injurious stretching of the perineum and risk of laceration of the pelvic structures."

Radford's Long Double curved Forceps consists of three blades, two of equal length and double-curved the other shorter and straight. One of the long double-curved blades is to be placed over the face and the short (straight) one over the occiput. The two double-curved blades are not required to be used together but in order to apply one or the other according to the relative position of the face. The shorter straight blade is to be invariably placed on the occiput.

KILIAN'S ARMAMENTARIUM. TAB. XXVIII.

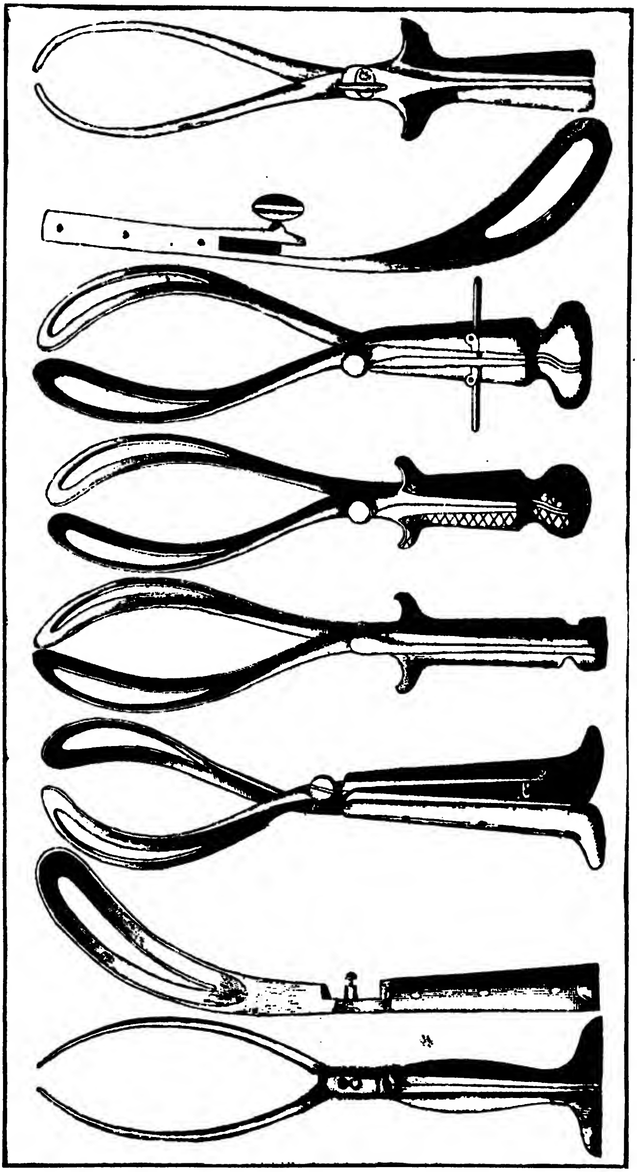

FIG. 376 Horn. 377 378 Mende. 379 D.W.H. Busch. 380 Naegele. 381 Kilian. 382 383 Huter.

1825. Guillon.

Guillon, a practitioner of Paris, invented a new articulation, which was highly commended by Henry* a surgical instrument maker. (See Maygrier a.a.O. Kymmell a.a.O. p. 54, Tab vii, 1 and 2 and Busch a.a.O. fig. 361). (See fig. 356).

1825. (?) Maygrier.

Prof. J. P. Maygrier of Paris, in his work "Midwifery illustrated" translated from the French by A. Sidney Doane, M.D., second edition, published at New York in 1833, gives an illustration of his forceps without however, describing it. (See Maygrier Nouvelles demonstr, etc. pl. LXXIII, p. 73. Kymmell a.a.O. p. 43, Tab iv, fig. 5—7 and Busch a.a.O. fig. 360). (See fig. 352).

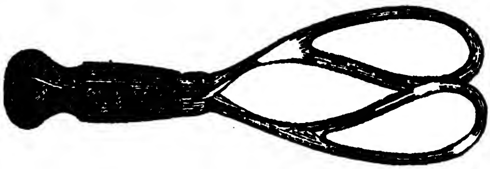

FIG. 384.
Collins's Forceps.
(From Weiss).

1826. Horn.

J. Ph. Horn's forceps is referred to, in his theoretisch practisches Lehrbuch der Geburtshulfe, Wien 1825. Also in Kymmel a.a.O. p. 42 Tab vii fig. 3 and 4 and Busch a.a.O. fig. 351. (See fig. 376).

1828. Mende.

Ludw. Jul. Casp. Mende, was born on 14th September, 1779, in Greifswald. He was educated in Berlin and Gottingen. He was at first Professor of practical Medicine in Greifswald but later on was appointed Professor in Gottingen. He evidently constructed two forceps, which have been described in

*Precis descriptif sur les instr. de chir. 1825.

Gemeinsame deutsche Zeitscrift fur Geburtskunde Bd. III, 1828, S. 274. See also Kymmel a.a.O. p. 44 and 46, Tab vi., fig. 8 and 9 and Busch a.a.O. fig. 352. (See fig. 378).

1830. Collins.

Robert Collins was Director of the Dublin Lying-in Hospital from 1826—1833. His forceps are 10 inches in length; 5½ in. the blade; 4 in. the handle; 2⅞ in. greatest width across both blades; 1½ distance between points; 1⅝ in. breadth of blade. The curve is nicely proportioned, most easy of application and quite strong enough for their work. The forceps is strictly a short forceps and therefore not so wide in their application as if one or two inches longer. (See fig. 384).

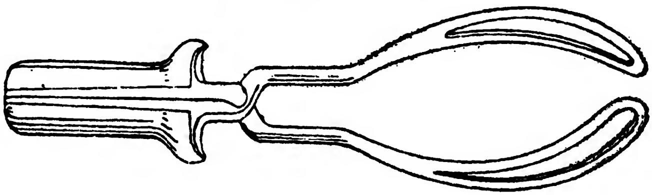

FIG. 385.
Blundell's Forceps.
(Witkowski).

1831. Blundell.

James Blundell nephew of Haighton was Professor of Midwifery in Guy's Hospital, London. His forceps is described thus in Doran's descriptive catalogue:—"Each limb is forged in one piece, the handles are coated with smooth wood, the palm-rest is big; there is no flange or finger-rest and no shoulder excepting the projecting upper border of the wooden coating. English lock. Long forceps with straight blades.

This instrument may be compared with the heavy handled modification of Ramsbotham's forceps introduced by Simpson who also made the handles longer. In this sample the length of the whole forceps and the proportion of the handles of the blades correspond precisely to Ramsbotham's description and drawings in his "Obstetric Medicine and Surgery" 5th Ed. p. 246. But in this instrument the blades are straight, whilst

Ramsbotham thought that the pelvic curve was "a useful addition to the long forceps." This forceps weighs $14\frac{3}{4}$ oz.; on the other hand the "whole instrument weighs $12\frac{1}{4}$ oz." according to Ramsbotham's description of his type. In that author's drawing, the shoulder of each handle is made of everted metal as in Simpson's modification here preserved; in this instrument the rudimentary shoulder is much simpler; Blundell's forceps was sometimes made with a flange or finger-rest on its handle."

For measurements see Appendix. (See fig. 385).

1831 (?). Waller.

C. Waller (of St. Thomas's Hospital) does not describe or figure his forceps either in his "Elements of Practical Midwifery or Companion to the Lying-in Room" London 1852 or in his edition of Denman's "Introduction to Midwifery." Waller died in 1862.

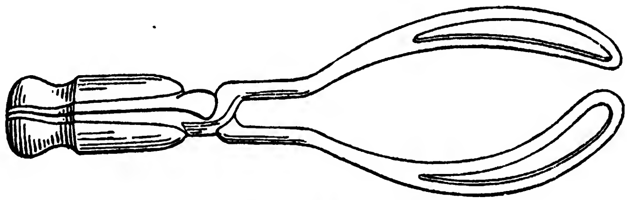

FIG. 386.
Waller's Forceps.
(Witkowski).

The following descriptions of two varieties of Waller's forceps in the Museum of the Royal College of Surgeons of England are reproduced from Doran's descriptive catalogue.

(1) "An instrument resembling Blundell's but with the handles much more slender, without finger-rests or shoulders of any kind; the long parallel shanks (2 in. or 5 cm.) not so far apart, the blades wider and the fenestræ as in Churchill's forceps, rather short. The inner side of the blades is perfectly flat.

(2) Similar to above but more solidly made and the blades stouter. They bulge out more freely from their shanks."

For measurements see Appendix. (See fig. 386).

1833. Casanova.

Dr. J. N. Casanova presented to the Medical and Physical Society of Calcutta, an elastic midwifery forceps and a Cephalo-extractor with the following remarks:— "These instruments are made of thin pieces of whale-bone, and are proposed as substitutes for the forceps and crochet. The forceps is a polished piece of whale-bone, above three feet long, three-tenths of an inch broad, and less than one-tenths of an inch thick; having a large silver ring at each end. This instrument is intended to bring down the head when it is locked in the pelvis: in using it, the whale-bone is doubled at the middle, so that both rings are grasped in one hand; the doubled part of the instrument is then carried up the vagina. and placed across the child's chin; a sliding band of silk (three inches in length, the ends of which are attached to the whale-bone), is to be pushed up, so as to rest across the child's cheeks, and thus prevent the throat being forcibly compresesd in the extraction.

The Cephalo-extractor is to be used in cases where the child's body has been removed, but the separated head is left in the uterus. This instrument is composed of two pieces of whale-bone, each precisely similar to the forceps, but without handles. These two pieces are firmly connected at the centre by a rivet, but moveable, so that the instrument can be introduced into the uterus when both the pieces of whale-bone are parallel and in contact throughout their whole length, when the instrument is thus introduced, so as to pass beyond the most remote part of the child's head, the two ends of one piece, are moved sidewise from the two ends of the other piece of whale-bone, until the central parts of the two pieces (where rivetted) form a cross: the four ends of the instrument are then passed through holes in a silver plate less than the size of a shilling; and by sliding this plate upwards, the instrument is firmly fixed, and the head included in the double loop; after which, any justifiable degree of force can be used in extraction, with facility to the operator and perfect safety to the patient. Dr. Casanova says that an instrument somewhat similar has been proposed by an obstetric practitioner of Barcelona. The author

states that the advantages of these instruments depend on their pliability, whereby no injury need be inflicted on the mother or child, while they are sufficiently stong for every purpose, and may be used without exciting the apprehension of the patient."

From the above description, it is evident that the so-called "elastic forceps" of Casanova was not a forceps at all but merely a whole-bone fillet. It may be presumed that both Kilian and Busch who refer to "Casanova's forceps"* never had an opportunity of consulting the original description of Casanova. Both of them include Casanova's forceps in their chronological list as well as in the classification list. In the latter, this so-called forceps is included amongst the variety with *fenestrated blade and crossed branches*--(! ! !), which is not the case as the above description will show.

1833. Audibert.

This forceps may be designated as "aide-memoire" or "indicator" forceps. Audibert had the peculiar idea of imprinting on the large, oval handles of his forceps some ovals, within which was drawn in miniature, the figures of the two straits, with their diameters and dimensions, as well as the shape of the head with its principal diameters and their measurements, and the direction of sutures, etc. (See fig. 398).

1833. Duges.

Duges made an attempt to give his forceps, a special manner of articulation which allowed both the blades to turn on their axis. These forceps probably combines the conditions of asymmetry to a large extent. Poullet thinks that this instrument has proved useless in practice. It is difficult of application and incapable of grasping the head properly. (See fig. 387).

*Transactions of the Medical and Physical Society of Calcutta, Vol. VI, 1833, p. 489: also Kymmel a.a.O. p. 101. Busch and Moser's Handbuch der Geburtskunde 1843 and Kilian's Operative Geburtshulfe 1849. See also, Tuthill.

KILIAN'S ARMAMENTARIUM. TAB. XXX.

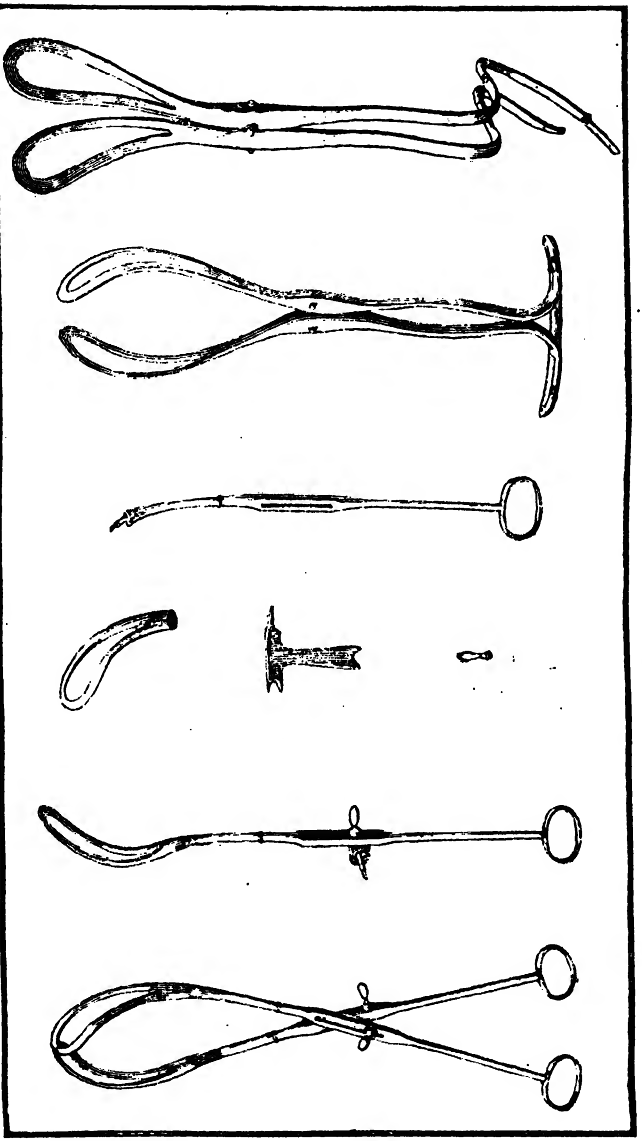

FIG. 387 388 Duges. 389 390 FIG. 391 Bernard. 392

1833. Baudelocque (Jun).

A. C. Baudelocque, nephew of J. L. Baudelocque, was a distinguished obstetrician of Paris. Probably he modified his uncle's forceps which is evidently referred to by Bethel in his article on "Description of a New Obstetric Forceps constructed upon Philosophical Principles" in the American Journal of the Medical Sciences, July 1853, p. 117, as "a pair in my possession (Baudelocque's)." The following description is quoted from the above article:

"Their whole length in a straight line is 18 inches, blades 8½, shanks 1½, handles 8½. The radius of the posterior curve is 17 inches that of the anterior 10½. The widest space between the blades when the handles are closed, strange to say, is near the apex ; and when the blades are sufficiently open to receive the biparietal diameter say 3½ inches, the ends are full 3 inches apart. Weight 26¼ ounces. No argument is required to show that this apparatus is totally unsuited to the purposes for which it was intended." (See fig. 404).

1833. Hodge.

Hugh Lenox Hodge was born in 1796. His father died two years after (*i.e.*, 1798) and his mother with examplary self-denial educated Hugh, who at fourteen, entered Nassau Hall Princeton and studied medicine afterwards with Dr. Caspar Wistar, at the University of Pennsylvania, taking his M.D. there in 1818. Very anxious to go to Europe, he tried to get the money by taking a surgeoncy on a ship going to India, but returned in two years minus the money but richer in experience through work in the cholera hospitals and studying tropical diseases.

As early as 1823 he became lecturer in the Philadelphia Medical Institute. For nine years he lectured there on the principles of surgery and in 1832, on the resignation of Dr. Dewees, he became the lecturer on obstetrics. In November, 1835, he was honoured with the appointment to the Professorship of Obstetrics in the University of Pennsylvania, on the retirement of Dr. Dewees. This important station he retained

KILIAN'S ARMAMENTARIUM. TAB. XXXI.

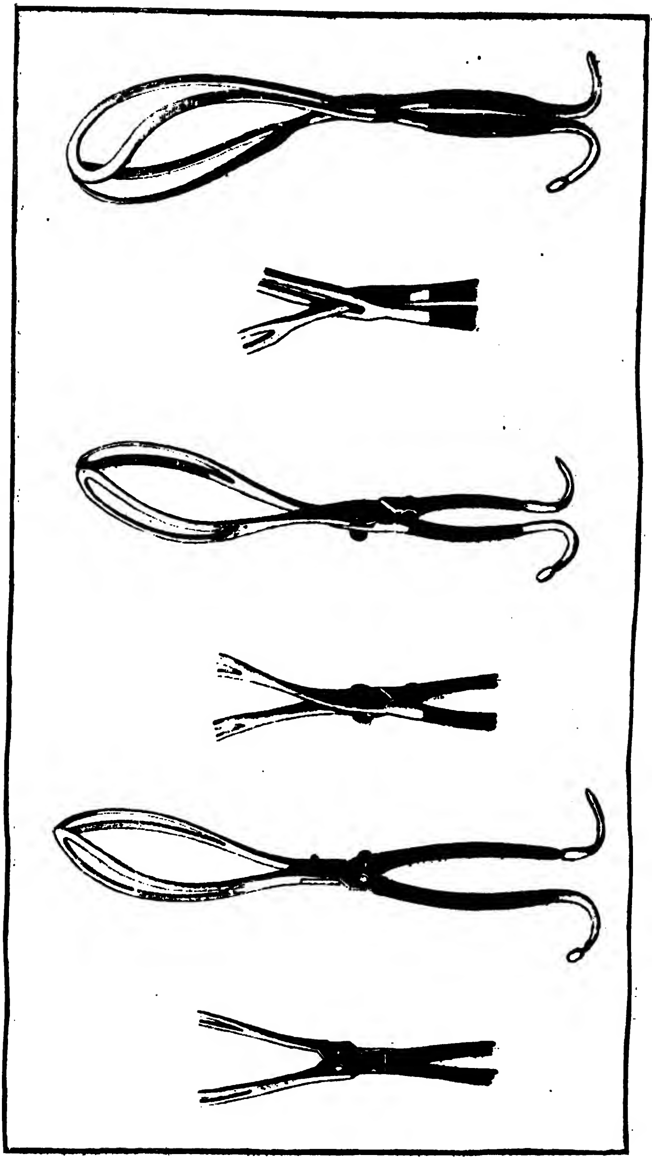

FIG. 393 Thureaud. 394 FIG. 395 Tarsitani. 396 FIG 397 Audibert. 398

until 1863, having discharged the duties of a public lecturer, without interruption, for forty years, thirty-one of which had been spent in the teaching of obstetrics. During the whole of this period his time was much engrossed with an extensive private practice. He was also Physician in attendance for seven years at the Alms-House Hospital and for thirteen years, was one of the accoucheurs at the Lying-in Department of the Pennsylvania Hospital.

Hodge modified the obstetric forceps on eclectic principles, a description of which is given below. But his name has become indissolubly connected with the pessary. How he came to invent the pessary and what the instrument meant, is a pleasant bit of biography. Hodge followed up Dewee's work in inventing and using pessaries for uterine displacement and devoted himself for years to the discovery of the proper materials and shapes, having hundreds made of various kinds. The case which first attracted his attention to the value of mechanical support was that of a woman who in 1830 came to the hospital ward with a diagnosis of hepatic disease. The usual treatment, including a course of mercury, left her worse. The resident physician on making an examination found decided retroversion of the uterus. Hodge introduced one of the then new Dewees pessaries and to his astonishment the liver complaint was cured and the woman speedily restored to health. Sitting one evening in the university "his eyes rested on the upright steel support designed to hold the shovel and tongs which were kept in position by a steel hook and as he studied its supporting curve the longed-for illumination came and the lever pessary was the result." Afterwards he perfected his discovery by giving the instrument its double curve and making it closed.

Hodge made valuable contribution to medical literature. His book on "Diseases peculiar to Women" (1860) was particularly valuable. On the resignation of his professorship, he devoted himself to his great work "Principles and Practice of Obstetrics" (1864) which, from its philosophical character as well as its original teachings and illustrations, ranked among the first of its kind both in America and Europe.

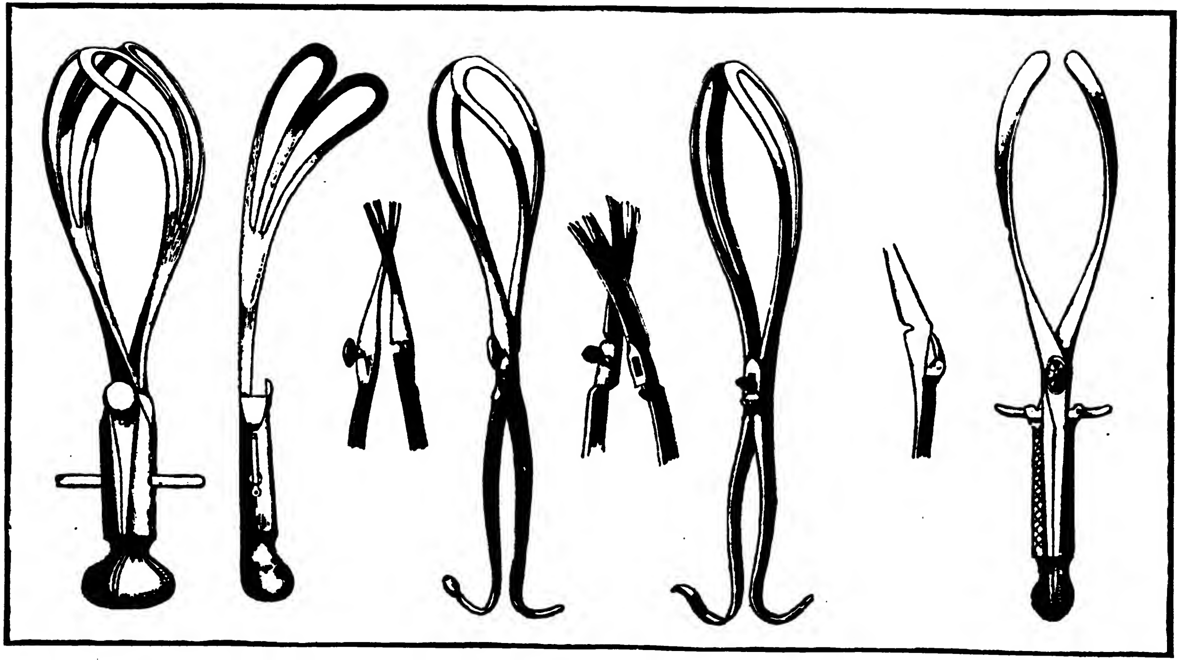

FIG. 399 Kilian. 400 FIG. 401 P. Dubois. 402 FIG. 403 Baudelocque. 404 FIG. 405 Scholler, 406

He was led to resign his professorship on account of failing eyesight, a weakness in the optic nerve which could not be relieved by surgical skill. At last he was unable to read and write, but his will was indomitable. For his great obstetrical work he had to rely on an amanuensis and such help as his medical confreres gladly rendered. Sixty-seven years old, yet with perfect faculties, he did all the professional work which could be done without eyes, and the poor, the hard-up people, the students could still count upon finding him in serene mind, tender and sympathetic and with loyal unswerving trust in God. He generously at this time presented the college with his valuable museum together with his collection of material used in making the 159 illustrations in his book. It is kept separate and under the curatorship of the Professor of obstetrics.

The day before his last illness he seemed in his usual health and was working till late afternoon with professional engagements and preparing an article on "Cephalotripsy." He went to bed perfectly well but near midnight was seized with nausea, faintness and heart-failure and died 26 hours later on February 26, 1873.

Hodge in his work "The Principles and Practice of Obstetrics" describes the *Long or French Forceps,* thus:—"Those generally known in this country are the "Baudelocque forceps." (See fig. 410). They are made of well-tempered steel, smooth and polished, and are generally about sixteen inches in their entire length—six or seven inches being the length of the handles and nine or ten inches from the joint to the extremities of the blades. The length of the blades proper is about seven inches; the shanks from the blades to the joint are three inches. At the joint the two opposing surfaces are flat, while the handles, somewhat rounded, are about half an inch in thickness, larger near the joint, and gradually tapering to their extremities, where they are curved to the form of a "blunt hook," for which instrument they may be substituted in case of emergency. The handles are not perfectly parallel—they bulge slightly outward, so that when brought together they are in contact only at their extremities. This outward curve enables the practitioner to grasp them more firmly.

The *joint* of the French forceps is of the tenon and mortise character—the pivot or tenon being received into an orifice in its fellow. This arrangement, although securing a very perfect lock, is nevertheless, very inconvenient in practice, as it will always be difficult to bring one blade in such exact opposition to its fellow as to allow an easy junction. .... The Baudelocque forceps, therefore in this country, has been very much improved by adopting what is termed Siebold's or the "German lock."

In the French forceps the flat surfaces connected with the joint are comparatively large, and thus tend to secure the proper parallelism of the blades and handles.

The blades of the French forceps or that portion which intervenes between the joint and the extremities, diverge gradually from the lock, as in the English forceps, but for about three inches are comparatively narrow, and are termed the *shanks* of the instrument ; while the proper *blade,* extending some six inches further, is, as to its general form, similar to that of Smellie's forceps--that is each blade resembles the section of an egg, the greatest breadth, toward the extremity, measuring one inch and three-quarters, from which it gradually declines toward the joint. Hence the fenestrae are long and large at the extremity, but narrow toward the shanks. The broadest part of the fenestrae is applied to the cheeks and the smallest part over the sides of the head and parietal protruberances, which projections, therefore, cannot be received into the fenestrae. Hence, these forceps necessarily occupy space in the cavity of the pelvis and as the edges of the fenestrae are often four lines in thickness, six or eight lines may be regarded as added to the transverse diameter of the head whenever these instruments are used.

The exterior of the blade is convex in its length, and also from one edge to the other, being thus well adapted to the concavities of the pelvis; but the internal or cephalic surface is concave only its length. Hence, although the outer edge of the blade may be thin, the edge of the fenestra is comparatively thick, and the blade is not accommodated to the surface of the cranium. Unequal pressure is, therefore, made especially by

the margin of the fenestræ, upon the scalp, so that in bad cases the tissues have been cut in a line, corresponding to the margin of the fenestræ. This is, of course, a serious objection and belongs even to the best continental forceps which we have examined.

The *shanks,* or that part intervening between the blades and the joint, in the French forceps, may be regarded as continuations of the blade, in as much as they are a continuance of the curve of the proper cephalic portion of the blade to the joint from which they regularly diverge. They are, however, free from fenestræ, and are very important by allowing the blades to be introduced far into the pelvis, even to the superior strait, without the lock entering the vulva, thus giving a decided advantage to the French over the English forceps; the use of the latter being restricted to the inferior strait, or at any rate to the cavity of the pelvis."

"The author having, by experience, satisfied himself of the respective advantages and disadvantages of the forceps in common use thought it possible that their excellencies might be combined in one instrument and their defects avoided. This ....he has endeavoured to accomplish. This modified instrument (see fig. 411)...........will, he believes, be found to embrace all the advantages, without the defects of the Baudelocque forceps." (See figs. 407 to 410).

In exhibiting a sample of Hodge's forceps before the Philadelphia Obstetrical Society on 26.6.1872, Dr. Harris remarked that Professor Hodge* produced "his present instrument step by step in gradual changes and improvements, as experience pointed them out to him, commencing with an important alteration in the long forceps of Baudelocque and gradually departing from it until but little of the original type is left." In illustration of this fact Dr. Harris exhibited two of the early improvements of Dr. Hodge as historical curiosities ; in one he changed the cephalic curve and in the other the pelvic, opening the fenestrae of the second, bevelling their edges and giving them an oval instead of loop shape. These instruments were made

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*Amer. Jour. of Obs. Vol. v, p. 341.

unnecessarily heavy according to our present ideas, but at the time of their production, strength was imparted more by weight of metal than hardness of temper, the same amount of stiffness being now possessed by forceps of half the weight. Even the final shape of the Hodge forceps, although much heavier than

Evolution of Hodge Forceps

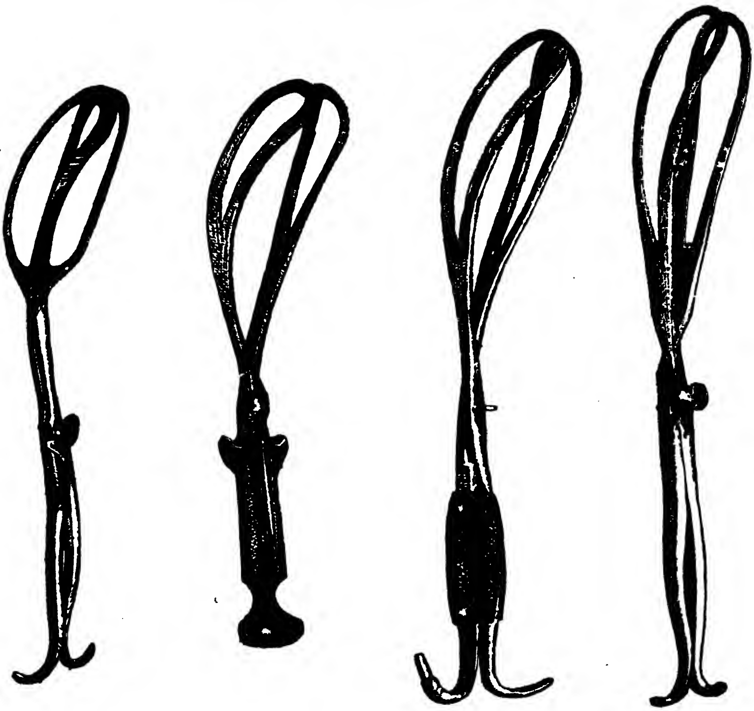

Fig. 407. Hodge

Fig. 408. German.

Fig. 409. Dubois.

Fig. 410. Baudelocque.

(From Hodge).

those made now, was sometimes materially altered in use by the bending of the shanks under pressure.

Hodge gives a decided preference to the French instrument over all the varieties of English or German forceps. The author has however, modified the French Baudelocque instru-

ment, so as to eliminate its defects. The modifications* consist of:—

"First. The weight of the instrument has been diminished from 26 to 17 ounces. Care should be taken while thus diminishing the weight of the forceps, that its strength be not impaired. The steel should be so well tempered and so firm that the blade will not yield or slip even when great compression is made.

Second. The pelvic curve is slightly increased so that the perineum may not be dangerously pressed upon when the blades are in the axis of the superior strait. To counteract any loss of power which may ensue from this increased curvature there is a bend in the handles in an opposite direction, that the direct line of traction may be preserved—a suggestion by Mr. Rover.†

Third. The shanks are nearly parallel, one being anterior to the other; they diverge no more than is absolutely necessary until they approximate the blades where a more rapid curvature than in the French forceps occurs. This parallelism of the shanks prevents any undue pressure or stretching and diminishes the liability to laceration of the perineum.

Fourth. The cephalic portions are nearly the same breadth throughout, being equal to that of the extremity of the French forceps. The advantages of this greater breadth are the affording of a firmer hold of the head and allowing of larger fenestrae, so that the parietal protuberances may project into the openings, and no space be occupied by the blades when properly applied.

Fifth. The cephalic surface of the blades has a double concavity as in Haighton's forceps, being curved not only from one extremity to the other, but also transversely from one edge to the opposite. Thus a flat surface is always presented to the scalp and there is no danger of this tissue being injured, even when great compression is made. The inner surface of the extremities, which come in contact with the temple or face of the child, has been flattened, as had been done in Davis's forceps.

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*The Principles and Practice of Obstetrics by Hugh. L. Hodge. Philadelphia. 1861, p. 234.

†Mr. John Rover was a Surgical-instrument maker of Philadelphia.

Sixth. The space between the blades corresponds to the ovoid shape of the head, the cephalic curve beginning moderately at the extremity of the blades and gradually increasing for about two-thirds its length and then diminishing more rapidly toward the shanks. Hence when the handles are in contact, this space is very regularly oval ; the greatest transverse diameter being about two-thirds of the length from the extremities and measuring 2½ inches—the points of the instrument at this time, being separated about 6 or 8 lines. Hence when the forceps are applied to the head and the handles of course, partially separated, the parietal protruberances correspond to the greatest breadth of the forceps, while the interior portions of the blade will be in very exact conformity to the lateral portions of the head. The advantages of this arrangement are very great ; for when traction is made, the force is directed very equably upon the whole side of the head, anterior to the parietal protruberance and not on any particular points ; thus increasing the stability and efficiency as well as the comparative safety of the instrument. Another advantage is that the forceps, with this curve are less liable to slip, for, when compression is made, the blades will glide nearer to the mental extremity of the head, just in proportion as the biparietal diameter is diminished by the lateral pressure. Thus, a small head will sink deeper into the grasp of the forceps than a larger ; or if a head should, from the necessity of the case, be perforated and thus diminished in size, the forceps, by this arrangement, will be in no danger of slipping, but on the contrary, would receive the head more completely within its grasp, as its diameters diminish.

Many practiiioners have objected to all forceps which allow any great compression to be made on the head............This restriction however limits the use of the forceps, preventing their employment as compressors where there is a disproportion between the head and the pelvis.

Seventh. The very ingenious and scientific mode of locking the blades, as in Siebold's forceps, by means of a conical pivot and the corresponding oblique conical opening for its reception, is adopted, by which all the facilities of the English junction are

enjoyed and the security and firmness of the French joint maintained.

1833. Campbell.

Busch and Moser in their Handbuch der Geburtskunde refer to this forceps, which is classified under forceps, with cephalic, pelvic and perineal curves and crossed blades. The following references are given:—W. Campbell, Introduction to the study and practice of Midwifery. Edinb. 1833, p. 233 and Kymmell, a.a.O. p. 88 Tab. VIII, fig. 16 and 17. The description and diagrams are not available.

1833. Hatin.

Busch and Moser allude to this forceps in their chronological table of forceps and include it in an added list, amongst forceps with crossed, fenestrated blades. Reference is made to Hatin's book. See also Kymmell, p. 58, Tab. VIII, fig. 3 and 4.

1833. Hopkins.

A sample of this forceps was exhibited by Coxeter, instrument maker, at the conversazione of the Obstetrical Society of London in 1866. The catalogue does not contain any detailed description of the instrument but its measurements are given. (See appendix of measurements). (See fig. 412).

1834. Ramsbotham.

Francis H. Ramsbotham, was Obstetric Physician to the London Hospital and Lecturer on Obstetric and Forensic Medicine at the London Hospital Medical College. He died at Perth in Scotland on 7th July, 1868, at the age of 67. He constructed a forceps for his own use, which he describes thus:—The instrument measures, from the extreme of the handle to the tip of a blade, twelve inches and three quarters, of which four inches and a quarter form the handle, and eight and a half the blade, being one inch and a half longer in the blade than the short forceps, and a quarter of an inch longer in the

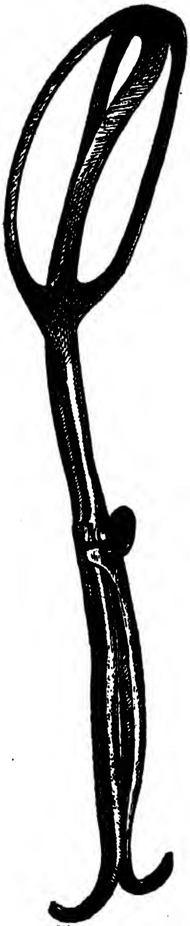


Fig. 411.
Hodge's Forceps.
(From Hugh, L. Hodge).

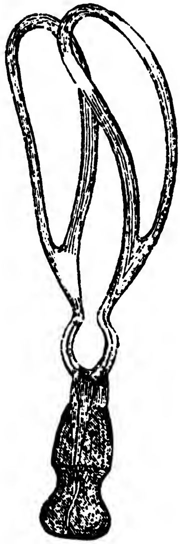


Fig. 412.
Hopkin's Forceps.
(Weiss).

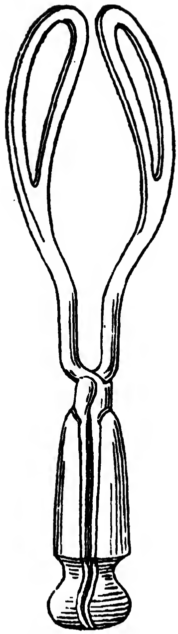


Fig. 413.
Ramsbotham's Forceps.
(Witkowski).

handle. The greatest width between the blades is about their centre, and measures two inches and seven-eighth; the points are an inch asunder. The whole instrument weighs twelve ounces and a quarter. From the handles, two parallel straight shanks arise, of an inch and half in length; and it is in the addition of this shank that the instrument differs principally from the curved forceps of Osborn, the belly of blade springing, not from the handle, but from the extremity of the shank. The object of this addition is to prevent laceration of the perineum, in the use of the instrument; for if the long forceps of Smellie or Haighton be employed, in which the curve takes its origin in the handle itself, the mother's structures at the outlet of the pelvis must necessarily be pressed upon unequally by the commencement of the blade, before the head has descended low enough to distend them uniformly; and thus great danger of injury must ensue.

In choosing an instrument, as remarked in regard to the short forceps, we must be particular that the internal surface of the limb of each blade be slightly convex; and the joint should be loosely formed, so that the handles, when locked, should be allowed a considerable play upon each other laterally. The shanks, too should be of the same depth throughout their whole length; so that each blade may slip along, within the groove of the other, from end to end of the shank.

In some cases, this will much facilitate the adaptation of the second blade. The instrument delineated in the cut possesses a slight lateral curve, and although I prefer a straight short forceps, I think the curve an useful addition to the long kind. (See fig. 413).

The following descriptions are copied from Doran's descriptive catalogue. For measurements see appendix .

(1) Original Pattern.

"This forceps precisely corresponds to that figured and described in Ramsbotham's "Principles and Practice of Obstetric Medicine and Surgery" 5th, 1867, p. 296. Dr. F. H. Ramsbotham laid stress on the long straight shanks which prevented

laceration of the perineum. The shanks were of the same depth through their whole length "so that each blade may slip along with the groove of the other, from end to end of the shank Ramsbotham particularly insisted that the blades be slightly convex on the inner side." Ramsbotham states that his forceps weighed 12¼ oz. (347 grms.). Sir J. Y. Simpson made the handles heavier and added Busch's finger-rest.

(2) Simpson's Modification I.

"Each limb is forged in one piece, the handles are coated with chequered wood, the palm-rest is big, there is no finger rest, but a shallow shoulder is formed by everted metal along the upper border of the wooden coating. English lock.

The shanks are long running almost parallel for 1½ inches (3.8 cm.). The blades have a distinct pelvic curve, their inner surfaces are slightly flattened and the edges of the fenestrae very convex.

Ramsbotham's typical forceps measured 12¾ inches, the blades being 8½ inches long. In this sample, the blades are of the same length, but the handles are 5 inches long, whilst in the type they were only 4¼ inches long. The type weighed 12¼ oz. this sample 17¾ oz. Ramsbotham adds in a foot-note, "The form and dimensions of this instrument are now generally adopted and known as 'the long forceps' from the fact of the learned Professor Simpson, being in the habit of using blades of the same make with handles of a heavier kind, though I had published a description and delineation of it so long ago as the year 1834."

This instrument has "handles of a heavier kind" than in Ramsbotham's type. There are no flanges or finger-rest as in Simpson's long forceps, where there were deep finger depressions along the handle instead of a distinct palm-rest. Oldham's had the long shanks and the finger-rests, but no palm-rests, the handles being smooth. As the finger-rests or flanges were invented long before Simpson's long forceps, so the long shanks with a space between them were already introduced by John Evans of Oswestry and by Aitken before 1784.

(3) Simpson's Modification II.

"The instrument closely resembles the preceding forceps being of the Ramsbotham type, but with longer and heavier handles, a variation to which that authority took exception. The wood of the handles is smooth. In this forceps the inner surface of the blades are flat, not convex, as in the typical forceps described and figured in Ramsbotham's Text Book."

1835 (?) Krassovsky.

Prof. Krassovsky of St. Petersberg modified the forceps of the Prague School. The instrument has Busch's lock and was used by Prof. K. as short or long forceps. He also used them as a tractor before and after perforation of the head in cases of distorted pelvis, where the child was dead. This instrument was exhibited at the conversazione of the Obstetrical Society of London. The measurements will be found in the appendix. No diagram is available.

1835. Cazeaux.

P. Cazeaux, Member of the Imperial Academy of Medicine, Adjunct Professor in the Faculty of Medicine, Paris, published his book "Traite theory et prat de l'art des accouch" in 1840. In an English translation of this book it is stated "we shall only describe the forceps now generally used throughout France which is none other than that of Levret, very slightly modified." Evidently the slight modification of which he speaks consisted in placing the mortise of one of the branches not at the centre but at the side of the instrument.

Diagram of a pair of modified Levret's forceps is given but it is not expressly mentioned that it is Cazeaux's modification. Presumably it is so. It may be noted that the handles in the diagram are not like these of Levret's but are covered with wood. (See fig. 414).

1836. Boens.

Boens contributes a note on a forceps with a third branch, which may be used at discretion for the hands of an assistant

in a case of very difficult labour. No description or diagram is available.

1836 (?) Moreau.

F. J. Moreau, Professor of Midwifery and the Diseases of Women and Children in the Faculty of Medicine of Paris and Physician to the Lying-in Hospital describes his forceps in his "Practical Treatise on Midwifery" thus:—"As regards our own forceps, we do not pretend to present it as new; we have merely endeavoured to unite in it all the real advantages of those which have preceded it. It is a modification of that of Levret, elongated by Pean. It is sixteen inches and six lines in

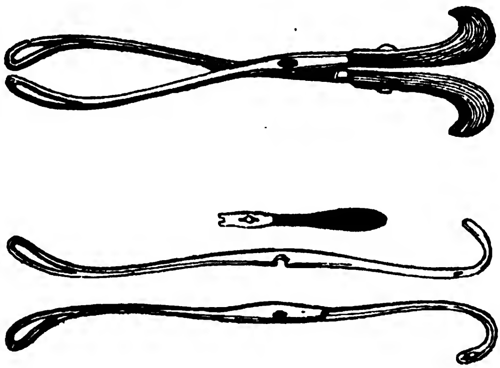


FIG. 414.
Cazeaux's Forceps.
(Cazeaux and Tarnier).

length. The blades are oval inferiorly; they are seven and a half lines in width and three in thickness. When closed, their thickness at the pivot is seven lines. The distance from the pivot to the ends of the blades is nine inches and three lines. The separation at the centre of the blades, is nineteen lines above and twenty-one below. Near the point of junction the blades are more contracted than in other forceps, an arrangement which prevents laceration of the vulva, and does not allow this part to be distended except by the fœtal head, when

this is about escaping externally. The blades are four inches and nine lines in length and five in width ; only one line in thicknes at their inner margin; the fenestra are two lines in thickness at their external margin, thus permitting the parietal protruberances to lodge in them without any sensible increase of the biparietal diameter of the head. The handles are curved in a crotchet like shape. That of the male blade terminates in an olive shaped end, forming a blunt hook and which being unscrewed, exposes a sharp hook which it encloses. That of the female blade represents an angular crotchet, forming a sheath on the back, concealing a perforator." (See figs. 415-7).

1836. Bernard.

Dr. Camille Bernard of the Hotel Dieu of Apt. presented to the Academy of Medicine of Paris, on the 13th December, 1836 his "forceps assemble"—a united forceps of the parallel type which allows the introduction of the two branches simultaneously and thus avoids not only the inconvenience of successive introduction but also the difficulties of articulation. The blades are permanently united by a chain which permits them to be introduced superposed. An account of it was published in Gazette des hopitaux (t. X. p. 596). (See fig. 391-2). They are introduced well in and then, by a sort of spiral movement, the blades are placed on the two sides of the head, and are then fixed.

1838. Niemayer.

For a reference to this instrument, see E. Meyer. Geburtshulfliche Beobachtungen und Ergebnisse. Bremen, 1838, S. 165 Tab. II. (See fig. 418).

1839. Huter.

Carl. Cristoph Huter of Marburg was born in Melsungen on 6th March 1803. He was a pupil of Busch and contributed liberally to obstetric literature, and described his forceps in a monograph. (See fig. 383).

FIG. 415.

FIG. 416.

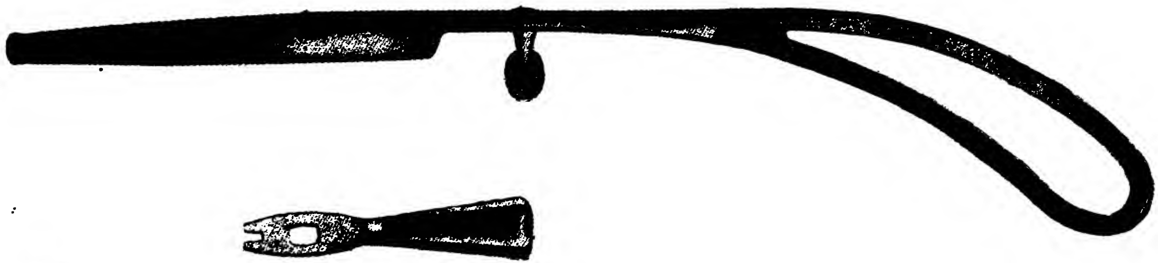


FIG. 417.

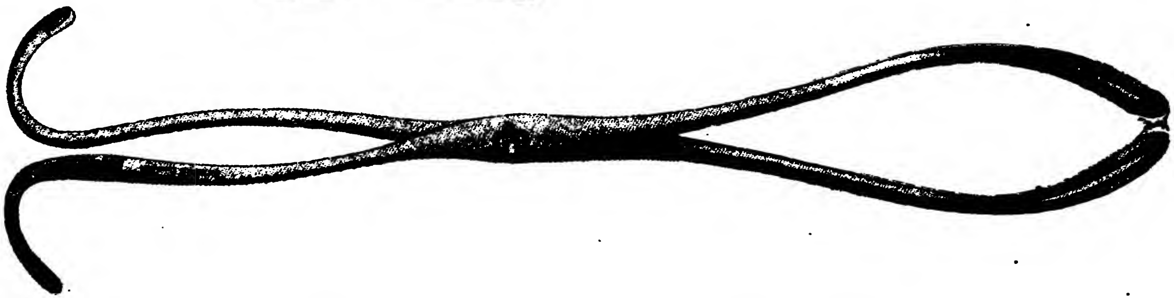


FIG 415.—Side view of the male branch, showing the shape of its fenestrum and the elevation of the pivot.

FIG. 416.—Key for turning the pivot and unscrewing the ends of the handles to expose the sharp crotchet and perforator.

FIG. 417.—Mcreau's Forceps (Complete). (From Moreau).

1839. Stoltz.

Joseph Alexis Stoltz, of Nancy, was born at Andlau (Lower Rhine) on December 14th, 1803. As a student of medicine, he was exceptionally brilliant. He became an Assistant of Professor Flamant, having the charge of his extern clinique. His work on the 'Induction of Premature Labour' was published in 1835 and inspite of adverse French medical public opinion, the operation was gradually adopted in France, spreading from Strassburg as a centre to Paris and the rest of the country. Stoltz had the faculty of inspiring work in his assistants and many important works issued from his clinique. His work in the wards, and his lectures and demonstrations were highly appreciated. He was a skilful and careful operator. He accumulated a considerable museum of normal and pathological preparations at Strassburg. He was elected an Honorary fellow of the Obstetrical Society of London. The Franco-German war in 1870, ending in the annexation of Alsace and Lorraine entailed the transference of the Academy of Strassburg to Nancy. Stoltz retired in 1879 to his native town of Andlau. The characteristics of Professor Stoltz were his wide knowledge, accuracy, method, good judgment and uprightness. He died at the age of 92 on May 20th, 1896 after a short illness.

Prof. J. A. Stoltz modified Levret's forceps by making the blades a little more wide and by making the handles like those of the English forceps. This forceps is slightly shorter than the French Forceps used at Paris and a little longer than those generally used in Germany. It is 42 c.m. long, 22 from the point of articulation to the tip of the blade and 20, from articulation to the extremity of the handle. The blades are fenestrated, the fenestrum being 13.5 c.m. long. The greatest width of the fenestrum is at the junction of the upper with the middle third and is 2 cm. The edge or border of the fenestrum is 12 mm. wide. The greatest width between the blades, which is to be found at the upper third of the ellipsoid, is 7 cm. The divergence of the blades commences from a distance of 4 cm. from the point of articulation while the curve, begins 10 cm. from that point.

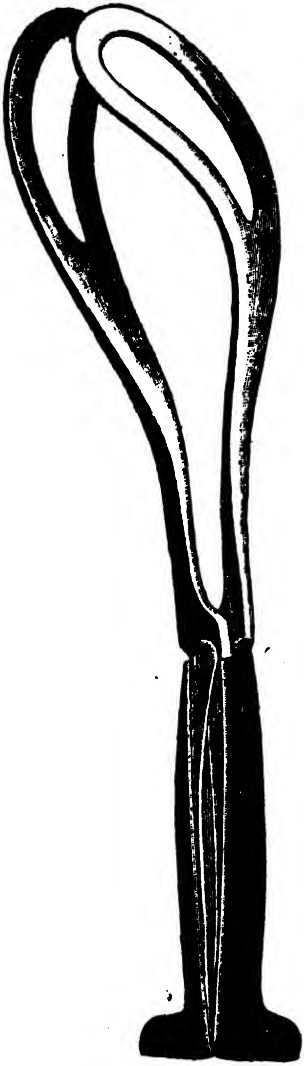


FIG. 418.
Niemayer's Forceps.
(Jetter & Scheerer)

FIG. 419.
Stoltz's Forceps.
(Witkowski).

The distance between the tips of the blades, is 1 cm. The pelvic curve begins from the place where the ellipsoid is formed. The blades are larger than those ordinarily seen on other forceps; they are concave and exert a pressure during use; the external surface is convex, the greatest thickness is found at the internal border of the fenestrum which is also the strongest portion of the blade; the external border is blunt. The blades, thus, are not only wider but their fenestra more open and their cephalic curve, more pronounced. Moreover, the greatest divergence of the blades is more than that of most known forceps; while the ellipsoid is near the extremity of the blades.

The mode of articulation is that with a notch and a movable pivot. The two branches, flattened horizontally near the articulation, rest on each other. The lower branch is provided with a screw with an elliptical head, while the upper is supplied with a notch, into which the pivot accurately fits. By turning the screw the branches become firmly fixed. Immediately above the point of junction (*i.e.* in the part which gradually merges each into the blades) the branch is strong enough to bear the greatest amount of resisting force.

The handles are covered with chequered wood, which forms two lateral projections, at the lower end of which there is a deep groove. This arrangement allows the hand to grasp the handles firmly and contributes to the elegance of the instrument.

Stoltz realised the advantage of the arrangement of the handles in the forceps of Busch which were provided with hooked projections, to serve as a *point d'appui* for the index and the middle or the ring finger, during traction. But he found that these projections not only interfered with the introduction of the branches but even spoilt the elegance of the instrument. He therefore made these projections mobile, so that they may be placed against the branches and formed into a slight projection continuous with the wood covering of the handles.

The first forceps of Stoltz was manufactured by Charrierre. Two ears or movable hooks are attached to the upper part of the handle by means of a strong hinge, so that the hooks, when raised, form a continuation of the handle and, when lowered,

FIG. 420.
Martin's Forceps.
(Jetter & Scheerer).

present two wide and slightly concave projections, with well-rounded edges, on which fingers can rest, not only to exercise a great tractile force but also easily to give to the instrument and to the head, a proper direction without tiring the hand. The instrument weighs 725 grammes. (See fig. 419).

1839. Martin.

Professor Edward Arnold Martin was born at Heidelberg in 1809 and was first a law student but eventually elected to study medicine and became a pupil of the celebrated Naegele. He graduated at Gottingen. In 1837 he began to lecture on midwifery at Jena and soon after was appointed director of the Clinic and Policlinic Institute for Midwifery in the same university. In 1858 he was advanced to the chair of Midwifery and diseases of women in Berlin in succession to Prof. Busch. He was the author of numerous books and monographs and a constant contributor to medical journals. He was for sometime the leading obstetric authority in Berlin and was selected to attend the Crown Princess of Prussia (Princess Royal of England) in her first confinement. He was an Honorary Fellow of the Obstetrical Society of London. He died in 1875.

The following description of his forceps is taken from Doran's Descriptive Catalogue. (See fig. 420).

"This forceps was avowedly made of medium size by its designer, small enough to be easily packed in a kit yet long enough to be serviceable when the head is high in the pelvis. Each limb is made of one piece of metal and the handles are coated with smooth wood. The palm-rest is quite of the English type; the lock is also English, but with the clip omitted on the right blade (as in D. W. Busch's forceps), and each handle bears a wide finger-rest.

Blades, thick and heavy with strong pelvic curve, shanks flattened antero-posteriorly, parting from each other at an angle of 45° and joining the blades without any distinct limits. Edges of blades very thick and rounded, inner surfaces distinctly concave. Lower end of each fenestra rounded off, for application of tapes or towels for traction purposes.

This instrument figured in Eduard Martin's "Hand Atlas fur Gynakologie und Geburtshulfe" 1861, pl. lxxi, figs. 1 and 2, was originally figured and described in that obstetrician's "De Gebaranstalt und die Geburtshulflichen Kiniken der Universitat Jena," 1848, p. 79 and pl. iii. Martin introduced this forceps in 1839 and employed it regularly in the Jena Maternity Department. He made the handles shorter than in most long forceps of his time, only as he stated, of sufficient length to hold the fœtal head firmly without undue pressure. The flanges or finger-rests were for the operator's fore and ring fingers, the gap between the shanks for his middle finger. Martin adopted the English lock but without a clip on the handle of the right blade. "Above all, the borders of the forceps are carefully rounded and polished so that neither the mother, the child nor the operator can suffer injury when the instrument is properly used." For measurements of (1) sample exhibited at Obs. Soc. and of (2) sample in R. C. S. Museum, see Appendix.

1839. Greenhalgh.

Robert Greenhalgh was Physician-Accoucheur and Lecturer of Midwifery to St. Bartholomew's Hospital and Physician-Accoucheur to the Samaritan Free Hospital, London. He died on 7th November, 1887.

Three samples of his forceps were exhibited at the obstetrical Society's conversazione, *viz.* (1) a short straight (1839) and (2) a short curved (1839) and (3) a long curved (1852). (See figs. 421-3). The inventor states "that his instruments are strong, light and wieldy and suited to any and all cases requiring the use of the forceps. The blades in the two former are not so broad at their terminal extremities as in the latter. The fenestrae are sufficiently open at their lower extremities to admit of the protrusion of a small portion of the scalp and even bone, as in D. D. Davis's forceps so that there is little or no addition made to the size of the head and a firmer hold is thereby obtained; besides which the soft parts of the child are permitted to come in contact with the soft parts of the mother thus preventing all risk of bruising during extraction. The blades

are rounded out internally and well adapted to grasp firmly a spherical or ovoid body. The handles are short and of roughened ivory, that shortness being compensated for by a ring for the insertion of the finger or towel, by the aid of which, any amount of justifiable extractive force can be exerted and the shank in the long forceps which also enables the operator to avoid undue distension and risk of laceration of the perineum,

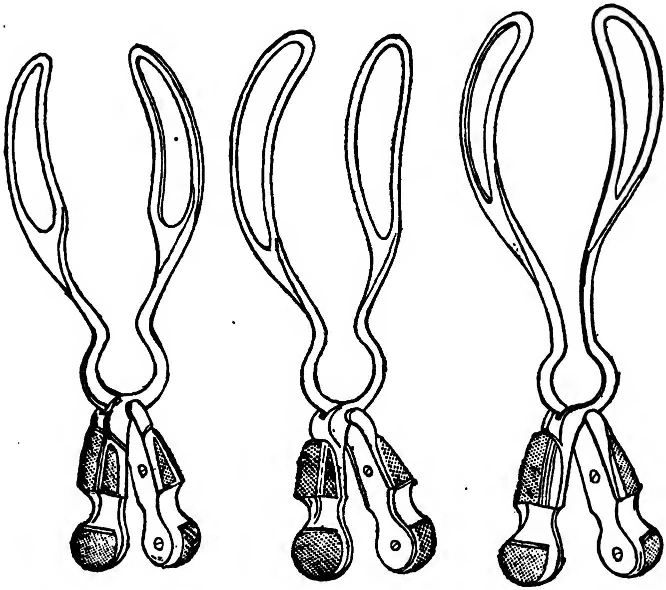


FIG. 421 Greenhalgh short straight.

FIG. 422 Greenhalgh short curved. (From Obs. Soc. Cat.)

FIG. 423 Greenhalgh Long curved.

besides the inclusion of any of the soft parts within the lock. In the long curved forceps, the pelvic curve extends throughout the whole instrument, as in Naegele's forceps, by which a more perfect adaptability to the curve of the pelvis without stretching the perineum, is secured."

The following is quoted from Doran's catalogue:—"Handles lined with smooth ebony, palm rest, no finger-rests. The shanks, although not widely divergent are bent strongly out-

wards so as to form a finger-ring, afterwards adopted by Barnes. The cephalic curve is sharp and the fenestrae wide; the blades are flat on their inner surfaces. It would appear that the handles were found to be too short and liable to cause injury to the soft parts, so that as in Lowder's modification of Orme's instrument, the handle was subsequently lengthened as in this sample.

The finger ring present in Radford's and generally associated at the present time with Barnes's forceps, is first seen in its simplest form in the second forceps designed by Van de Laar (1777) figured in Mulder's "Historia" pl. vi. figs. 11 and 12, where the round gap is narrow and probably meant rather for a tape than for the finger. In 1828 Ashwell, in his "Practical Treatise on Parturition" figures and describes (pl. XIII, fig. 3 and p. 545), Dr. Hopkins' forceps, which bears a larger finger-ring. *"The most valuable peculiarity* of this instrument consists in a considerable curve in each handle, adapted to receive the fore-finger of the operator by which finger the principal part or the whole of the extracting force may be applied."

Joseph Hopkins himself, however, in his "Accoucheur's vade Mecum" 6th edition, 1819, vol. ii, p. 56, figures a short forceps only, of the Denman type without shanks, but refers to another kind of forceps "denominated the double curved." Ashwell describes, how in Hopkins' forceps the lock is made on the reverse side. So that the upper blade may be introduced first, and how the inner side of the extremities of the blades, is slightly convex, while, he implies that the finger ring is a new invention.

No forceps with a finger ring is figured in Kilian's "Armamentarium" 1856.

For measurements see Appendix.

1840. Hermann.

The first instrument constructed to obtain better directed traction in the axis of the pelvis, was that by Hermann of Berne. The description of this instrument appeared in his

son's thesis in 1844. Sonntag mentioned about this forceps and Professor Bouchacourt spoke of this instrument in 1864 at the congress of Lyon. Tarnier probably was not aware of this forceps, as he makes no mention of it in his memoir published in 1878. Pinard has given two diagrams of this instrument in the article on forceps in the French Encyclopedic Dictionary of the Medical Sciences (1878). (See figs. 424, 425).

Regarding this forceps Poulett makes the following observations in Lyon Medical, in 1879:—"Hermann's forceps, although rather coarsely constructed, seem to be a prelude to the improvements brought about since, by the present Surgeon of the Maternity of Paris. Like the forceps in vogue at the present day, Hermann's one offers a perineal curve and metallic traction rods fixed in openings almost at the same point. But both these ideas lay dormant during forty years in a show-case before trial was made to bring them into practical use.

Nevertheless, it should be remarked that the movable rods of these forceps were not meant to sustain the whole of the tractile force; they were only to be pulled simultaneously with traction exercised on the handle. (See figs. 367—9).

The above method reminds one of the manoeuvres employed by Kruger, Osiander and Pajot, which without any new appliance, enables one to employ traction on the head in a satisfactory manner, in all planes of the pelvis.

Charpentier observes that Hermann's forceps "possessed not only a perineal curve, like that in the forceps of Johnson, but also a considerable pelvic curve, with long blades and a special rod applicable either above or below the instrument according to the high or the low situation of the head." (See, Cyclopedia of Obs. and Gyn. published by W. Wood and Co. New York).

1840. Lovati.

Teod. Lovati was Lecturer in Midwifery in the University of Pavia. The following description of a sample of his forceps in the museum of the Royal College of Surgeons in England is given by Doran in his descriptive catalogue.

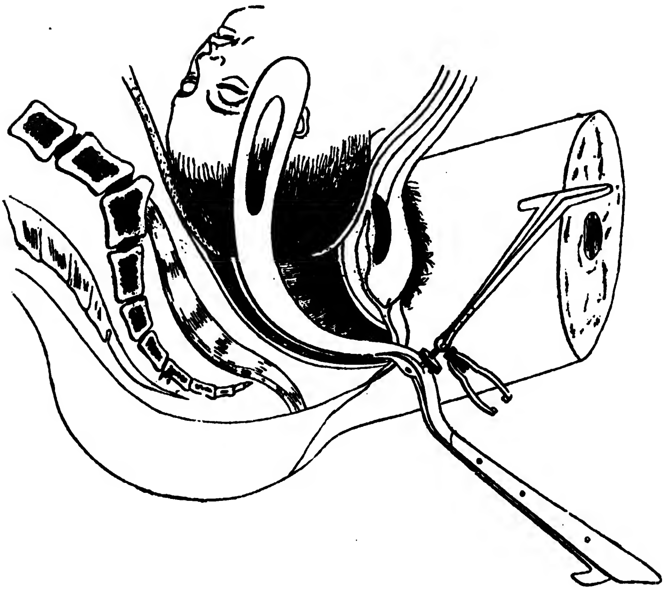


FIG. 424.
Hermann's Forceps. (Profile view).
Applied on the head at superior strait with traction rod above. (Pinard).

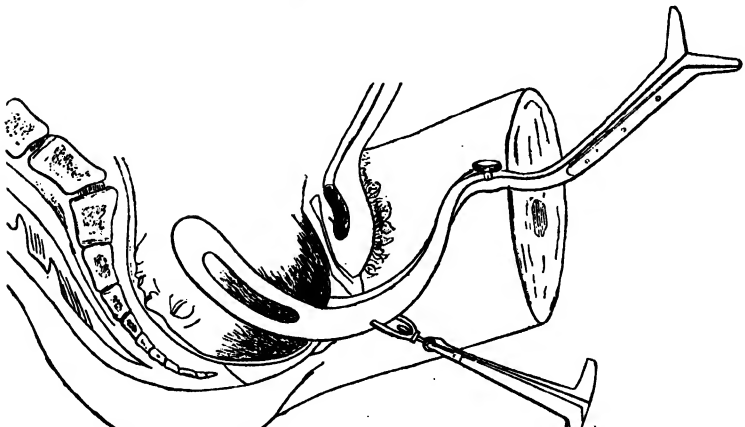


FIG. 425.
Hermann's Forceps (Profile view).
Applied on the head at inferior strait with traction rod below. (Pinard).

"A forceps after Levret's type, but the handles are longer and more slender and the handles are flattened not laterally but antero-posteriorly and cased with wood as in English forceps. The wood is smooth and bears deep finger depressions as in Simpson's long forceps ; there is a very broad palm-rest and the upper border of the wooden lining forms a shoulder, without any flange or finger-rest. There is a slot and thumb-lock as in the Levret's forceps in this collection." For measurements see Appendix .

1840. Rigby.

Edward Rigby was born with a twin sister at Norwich, on August 1, 1804. He assiduously carried on his medical studies in the great schools of Edinburgh, Dublin, Berlin, Heidelberg and lastly in London. On commencing his profession as an accoucheur in London, he obtained position and practice at an age when men are generally battling in the first struggles of medical life. As the translator of Naegele's celebrated essay on 'The Mechanism of Labour', Rigby must be given the honour of introducing this great advancement in obstetric knowledge into British practice. He was in succession Assistant-Physician and Physician to the Westminster General Lying-in Hospital. He was also Lecturer on Midwifery first at St. Thomas's Hospital and then at St. Bartholomew's Hospital during a long series of years. From 1841 to 1860 he served as Examiner in Midwifery in the University of London. He was the first President of the Obstetrical Society of London which was inaugurated in 1859. He died at the comparatively early age of 56, on December 27th, 1860, at his residence in Berkeley Square. The primary disease was found to be carcinoma of the bladder, the immediate cause of death being congestion of the lungs and suppression of the renal secretion.

The following description of a sample of his forceps in the museum of the R. C. S. England is given by Doran.

"The handles are coated with smooth ebony and there is a big palm-rest, but no finger-rest and hardly any shoulder. A pivot with a flat head, $\frac{3}{4}$ in., vertical measurement by $\frac{1}{2}$ inch deep in the border of the corresponding part of the right limb.

The blades have no distinct shanks, the pelvic curve is marked, the fenestrae long and inner surfaces flat sloping to the edges of the fenestræ. (See fig. 426).

Dr. Rigby wrote in 1841:—"The most perfect lock is that of Prof. Brunninghausen of Wurzburg, first introduced by ourselves into this country and commonly known among instrument makers under the name of Professor Naegele's forceps. One shank of one blade has a semi-circular indentation which at the moment of locking fits into a fixed pivot in the other; this therefore combined the advantages of the French and English locks." Rigby: "A system of Midwifery" p. 137 in "Tweedy's Practical Medicine vol. vi, 1841."

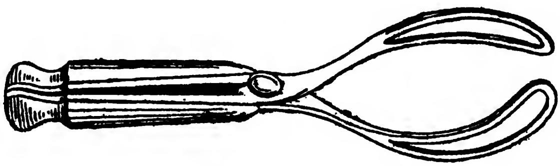


FIG. 426.
Rigby's Forceps.
(Witkowski).

1840. Churchill.

Fleetwood Churchill, was Professor of Midwifery, King's and Queen's College of Physicians, Ireland. The following description of his forceps is quoted from Doran's Descriptive Catalogue of a sample in the museum of the R. C. S. of England:—"Handles lined with smooth ebony, big palm-rest, they taper towards lock with trace of finger rest or shoulder.

The blades are long and slender, parting at the lock without any distinct shank, the cephalic curve is increased towards the point. There is no pelvic curve. Their inner surfaces are slightly convex, not flat. The fenestrae though wide are conspicuously shorter than in most similar forceps, so that the lower part of the blades is much stouter. This feature, together with the peculiar curve and the total absence of any shoulder or flange, distinguishes the "Churchill" type of forceps.

In 1841 Churchill wrote ("Researches on Operative Midwifery" p. 128):

"For myself, I prefer the long or short forceps with the single curve, with the blades and fenestrae somewhat narrow and approximating so as to allow of a firm degree of pressure; with their edges smoothly levelled off; and the blades sufficiently strong to prevent their springing, but not so thick as to add unnecessarily to their bulk." In the fourth edition of his "Theory and Practice of Midwifery" (1860), p. 339, Churchill observes "since the first edition of this work I have taken some pains to modify the shape and proportions of the short forceps .... I still prefer the single curved forceps. The length should be 12 inches of which the handles occupy 4. The intervals between the points of the blades when closed should be 1 inch and at the widest part of the curve 3 inches. The breadth of each blade at the widest part should be 1 inch,

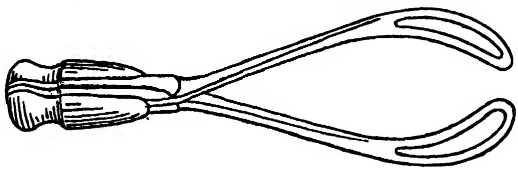


FIG. 427.
Churchill's Forceps.
(Witkowski).

the fenestra 2½ or 3 inches long, having the lower part of the blade solid steel, to give greater firmness. The curve of the instrument should not commence for fully 3½ inches above the handle and will consequently be much increased towards the point. Lastly the edges of the blades and fenestra must be nicely bevelled off. The abvantages I have found from these changes are an increase of tractile power, without the necessity of grasping the handles so tightly and compressing the head; the exact fitting of the head into the hollow formed by the curves, so as to avoid distending the perineum by a part of the instrument not actually of use, and the prevention of springing and slipping by solidity of the lower part of the blades." In this sample the curve of the blades is not quite so abrupt and the fenestrae are a little longer than in Churchill's standard instrument above described. For measurements see Appendix.

"Dr. Fleetwood Churchill was an Englishman by birth, an Irishman by adoption, cosmopolite by his erudition, a successful practitioner, a valued teacher both with tongue and pen, but above all, a high-toned Christian gentleman, who would have done honour to any country and reflected credit to any profession." With these words Dr. Charles West, the President of the Obstetrical Society of London, commenced an obituary notice of Churchill. Born at Nottingham in 1808, he obtained the degree of M.D., Edinburgh in 1831, and after travelling for some time settled down for life in Dublin. He was a voluminous writer and published books on midwifery, diseases of women and diseases of children, which passed through several editions in the British isles and America, have been translated into several languages and served as text-books for many generations of students. He also contributed valuable papers and elaborate treatises, which came in quick succession from his pen. He died on January 31st, 1878.

1840. Levy.

Carl E. Marius Levy, succeeded Saxtorph as Professor of Midwifery, in the Royal University and Chief Physician to the Lying-in Hospital of Copenhagen in 1840.

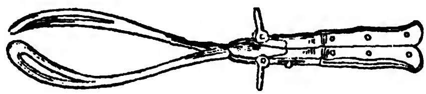


FIG. 428.
Levy's Forceps.
(Witkowski).

He constructed a forceps combining "the blades of Naegele with the handles of Sáxtorph, with small joined wings to support the fingers. The handles fold upon the blades." These forceps were in general use in Denmark about 1860. The following description is reproduced from Doran's Catalogue:—

"A highly-finished instrument, the lower part of the handles is coated, not laterally, but in front and behind with wood. No palm-rest; the lower ends of the handle are slightly everted. There is on each handle a finger-rest or flange connected at its base with a joint by which the handle can be folded on the blade,

a sliding catch below the flange serves to fix the blade. The lock is of the English type.

The blades have a marked pelvic curve, their inner surfaces are slightly convex and the fenestræ are short.................The earliest forceps with a jointed handle was designed by Freake. Joints designed for other purposes than convenience in packing are seen in Hamilton's and David Davis." (See fig. 428).

1842. Beatty.

Thomas Edward Beatty, Professor of Midwifery at the Royal College of Surgeons of Ireland, Dublin, was born on 1st January, 1800 and died 3rd May, 1872, from suppuration and pyæmia following cellulitis of neck after the extraction of a tooth. He obtained M.D. of Edinburgh in 1820 and became

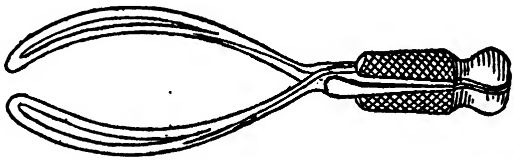


FIG. 429.
Beatty's Forceps.
(Witkowski).

F.R.C.S.I. in 1824. He soon acquired a large practice and honours were showered thickly upon him. He contributed various papers in medical journals and several essays in the 'Cyclopædia of Practical Medicine.' He describes his forceps thus:—"The entire length, including the handle, is 12½ inches; of the blade to the lock 8 inches; of the fenestræ 5¼ inches; the greatest breadth of blade 1⅜ inches; the widest part of fenestrum 1 inch; the distance between the blades when joined 3 inches at widest part; distance between the extreme points 1⅛ inch; weight of the whole 10¼ ounces. The sides of the blades enclosing the fenestra are nearly round, slightly flattened upon the inner and outer surfaces but having no sharp edge either upon the outer border or the margin of the fenestra." "From this it will appear that my forceps are well beyond the limit to which the term short can be applied."

For measurements see Appendix

The following description of Beatty's Medium forceps is given in Doran's Descriptive Catalogue.

"Handles lined with roughened ebony, big palm-rest no finger-rest ; broad sloping shoulder formed by upper border of wooden lining. English lock.

This is practically a Denman's forceps with long slender blades, broadest near the extremities with no distinct shank and with a clear space between the tips when the handles are closed. There is no pelvic curve. Beatty maintains that the blades being narrow can be easily introduced and handles readily locked. As the blades are long, the lock will lie well out side the vagina. In the Cat. Obs. Soc. (p. 90) it is stated "Dr. Beatty's straight forceps are remarkable for their lightness, weighing only 11 oz. for the length of their blades and for the slenderness of the arms of the fenestræ which are not rounded internally, so that their strength is not impassed."

Murphy modified Beatty's forceps and gives a drawing of T. E. Beatty's forceps in his "Lectures on the Principles and Practice of Midwifery" 2nd ed. 1862, p. 264. Barnes said that "the best single curved forceps is that of Dr. Beatty's."

Note :—T. E. Beatty's forceps must not be confounded with his father's (John Beatty's). "The instrument I (John Beatty) have always used is that which is called male and female from the transverse opening in the root of one blade through which the other is passed." "Observations on the use of instruments in cases of difficult and protracted labour" read before the Association of the College of Physicians, 1829 by John Beatty, republished in T. E. Beatty's "contributions").

1842. Kilian.

Dr. Hermann Friedrich Kilian was born on the 5th February, 1800 in St. Petersberg. He was educated at Wilna St. Petersberg, Mannheim and Berlin. He became Professor of Midwifery and Director of the Obstetric Clinic at Bonn. He was the recipient of numerous decorations, *e.g.* Royal Medical Privy Councillor, Knight of the Royal Wladimir Order IV class,

etc. He was a voluminous contributor to medical literature, including his monumental Atlas of Midwifery and Armamentarium Lucinae Novum. He brought out his "forceps galvanique" in 1842. This differs from that of Naegele in having a labimeter. His second forceps, with duplicated blades was made known in 1856. (See figs. 381, 399).

1843. Thureau.

Thureau of New Orleans exhibited before the Academy of Medicine on 20th June, 1843, a forceps constructed by him. It consisted of two "hermaphrodite" branches, so called as each branch was provided with a pivot and mortise, alternately in front and behind. With this instrument, therefore, whichever branch is introduced first its mortise will be above or at the level of the pivot of the other. The branches crossed each other. (See figs. 393-4).

1843. Tarsitani.

Tarsitani of Naples, modified the French articulation by adapting a pivot on the top, in addition to a pivot below on the left branch of the forceps, so that the right branch can articulate underneath, if one has been obliged to introduce it at first and the manœuvre of uncrossing is this avoided. The instrument resembles that of Levret. The branches cross but the articulation is so constructed that the female branch can be fitted with equal ease above or below. Each branch of the forceps is thinned out, to about half its thickness about the place where crossing takes place, so that when the branches are articulated, the blades correspond perfectly. The forceps was exhibited before the Academy of Medicine on 14th Nov., 1843 and on 16th April, 1844. (See figs. 395-6).

1843. Talatani.

A sample of this forceps was exhibited at the Obstetrical Society's Conversazione. No diagram or description is given in the catalogue. For measurements see appendix.

1844. Trefurt.

J. H. Chr. Trefurt, Professor in Gottingen, constructed a forceps which was in principle a combination of the instruments of Busch Naegele and D'Outrepont. Spiegelberg gives an illustration of this instrument in his book on midwifery (see fig. 430) and says he uses this instrument.

1846. Bedford.

Gunning S. Bedford was born in Baltimore in 1806. He graduated at Rutgers' Medical College in 1828. In 1829 he went to Europe where he remained for two years visiting the hospitals. On his return to America he was appointed, in 1833, professor to the Charleston Medical College, South Carolina and subsequently professor at the Medical College in Albany.

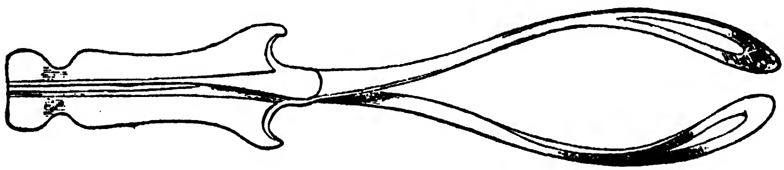


FIG. 430.
Trefurt's Forceps.
(Spiegelberg).

After a short time, he went to New York and settled there. He was the first to start the idea of founding the University Medical College and became the professor of obstetrics. This chair he held with great distinction till 1862, when he was compelled on account of ill-health to resign. He was the author of several books which were very popular. He died on September 5th, 1870.

The following description of Gunning S. Bedford's forceps appears in Chailly's Practical Treatise on Midwifery edited by Bedford (1846). See also Bedford's Principles and Practice of Obstetric, 4th Ed. (1868), p. 678:

"My forceps embodies some important improvements. The curve of the blades, their lightness and thinness (sufficiently strong however, for all ordinary purposes), I regard as a very

essential improvement. The blades of the forceps are usually too thick, unnecessarily so; this circumstance frequently prevents their introduction. In my judgment the thinner the blades, consistently with the strength required, the more advantageous will the instrument be found. Instead of the pivot lock, I have substituted the button joint and the advantage of this mode of articulation over the pivot will be at once conceded on testing the relative facility of locking the branches of the instrument.

In order to extract the head of the fœtus safely something more is needed than the mere adjustment of the blades; for if proper traction be not made and proper direction given to the

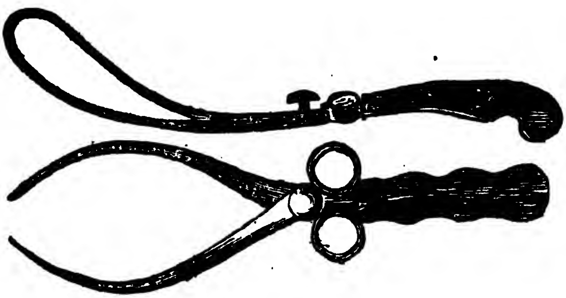


FIG. 431.

FIG. 432.

Bedford's Forceps.

FIG. 431.—Side view of left blade showing the length and curve of handle.

FIG. 432.—Complete articulated forceps.

(Bedford).

traction, the child will frequently be sacrificed and more or less severe injury ensue to the soft parts of the mother. To obviate these difficulties I have provided a handle of sufficient length and curve. The curve at the extremity of the handle will afford greater facility to the operator and give him more power than any forceps I have yet seen. The length of the handle likewise affords a proper lever for the traction. The two rings will enable the operator to give proper direction to the force employed and will at the same time, facilitate very much the lateral movements so essential to impart to the child's head during the stages of its delivery."

1847. Seubert.

L. Rau described the forceps invented by J. A. Seubert.

1847. Harris.

Dr. William Harris of Philadelphia devised an instrument of remarkable lightness which never became altered in shape. It closely resembled the instrument now known as the Wallace forceps except that the latter has much longer shanks which are more directly super-imposed and is better adapted for use at the superior strait for which the former was not intended. The Harris forceps were intended to shorten labour and prevent exhaustion in women who were deficient in muscular force. (Amer. J. Obs. Vol. V, p. 341).

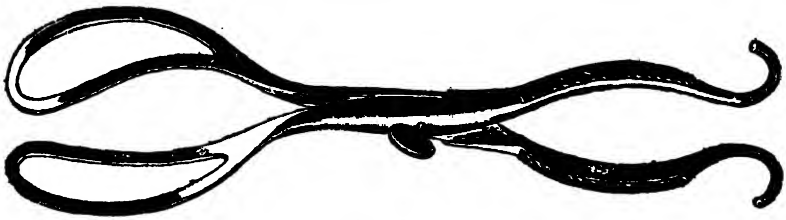


FIG. 433.
White's Forceps.
(Richard Kny & Co.).

1848. White.

James Platt White was born on March 14, 1811 at Austerlitz, Columbia County. He took his medical degree from Jefferson Medical College in 1834. The establishment of the Medical School in Buffalo was largely due to his exertions and his work as professor of obstetrics and gynecology went on until his death. He made some important contributions to medical literature. He died in the autumn of 1881 after a brief illness.

He constructed a forceps, a description of which appeared in Buffalo Medical Journal 1848-49, iv, 715.

1848. Simpson.

James Young Simpson of Bathgate, Scotland, was born in 1811. He became professor of obstetrics in Edinburgh in 1840

and soon acquired an enormous practice through his great ability and fascinating personality. As the first to employ chloroform in obstetrics (1847) he made a great name for himself. He was a prolific writer and his contributions to medical literature were extremely valuable. He was one of the most remarkable personalities of his time. He died in May, 1870.

In a communication to the Edinburgh Obstetrical Society on May 10, 1848 "on the mode of Application of the long forceps" he spoke of his instrument.

'The long forceps differ from the short forceps in its length; in the shanks being parallel for some distance beyond the lock; in their blades being curved and in the part intended to embrace the head being sufficiently long and large. The instrument which Dr. Simpson has frequently and successfully used during the last 5 or 6 years has some additional peculiarities, as is seen in the woodcut. (See fig. 435-6). The blades are the same as Dr. F. Ramsbotham's but scarcely so much curved. The lock is Smellie's but with Knees or projections above it, of such size as to prevent the blades readily unlocking in the intervals between the pains, thus giving it the fixed character of the locks of Levret and Brunninghausen instruments without their complexity. The joints are made so loose as to allow of their lateral motion and overlapping to a very considerable degree. And lastly the handle is that used by Naegele and other German accoucheurs, *viz.*, with transverse knees or rests below the lock for one or two of the first fingers of the right hand to drag by, the long forceps being only properly used as an instrument of traction, not of compression. In addition the handles are grooved and marked on the anterior side to distinguish that from the other side when the blades are within the pelvis.'

The following are some of the dimensions of Dr. Simpson's forceps: Length of the entire instrument 13¾ inches; length of handle including the lock, 5¼ inches; length of shank, from the lock to the commencement of the curve of the blade, 2¼ inches; extreme breadth of blade at 1½ inches distance from the point of the instrument, 1¾ inches; length of the fenestra 4½ inches; extreme breadth of the fenestra 13 lines; breadth of the groove

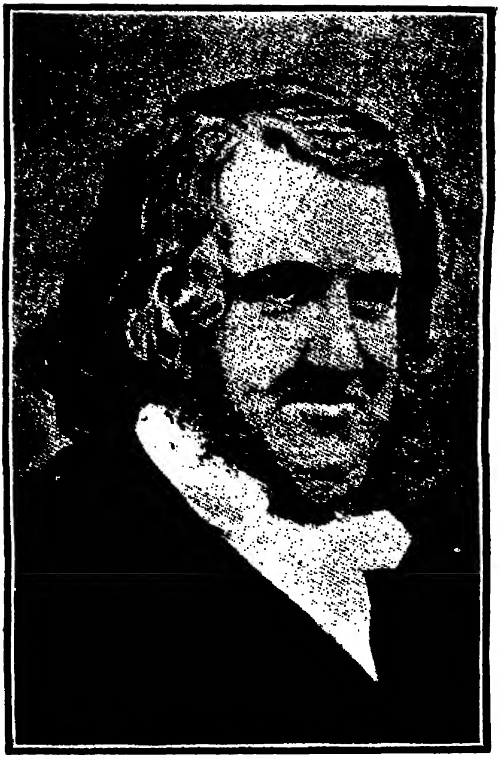


FIG. 434.
James Young Simpson
(1811—1870).

of the lock $\frac{3}{8}$ inch; thickness of the shank to fit in the groove of the lock 2/8 inch; extreme distance between the blades at three inches distance from the point of the forceps when locked, 3 inches; distance between the points of the two blades when locked, 1 inch.

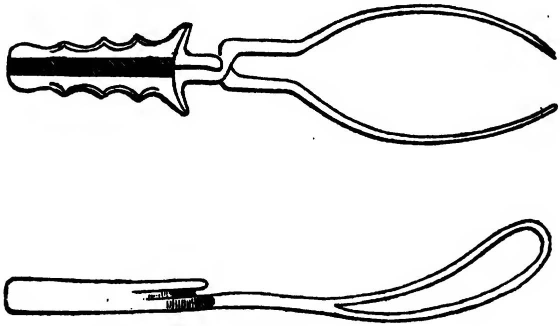


FIG. 435-6.
Simpson's Long Forceps.
(Simpson).

The following description of SIMPSON'S SHORT FORCEPS is given by Doran in his Descriptive Catalogue:

"Handles only $2\frac{1}{2}$ in (6.35 cm.) long, lined with a very thick and covex layer of roughened ebony; no palm-rest and no shoulder or flange or finger-rest. English lock.

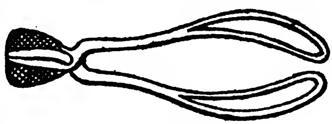


FIG. 437.
Simpson's Short Forceps.
(Witkowski).

Figured in the Cat. Obstet. Soc. 1866, p. 103: "The handles are very short and when locked the shanks of the blades are so apart that the finger can be placed in the space between them to facilitate the process of extraction."

The inner surface of each blade is almost flat; no pelvic curve.

Simpson's Long Forceps.

"Handles lined with ebony, smooth but with deep finger depressions ; no distinct palm-rests. The steel or inner part of the handles is fluted on the side corresponding to the concavity of the pelvic curve of the blades. Finger-rests or flanges very broad. English lock; shank with metal cut out.

As in Simpson's short forceps, the shanks of the blades part considerably above the lock, to allow the finger to be placed between them. The inner surface of each blade is flat, sloping towards the thick and rounded edge of the fenestræ. The pelvic curve is marked.

N.B. :—In Cat. Obs. Soc., p. 103 this sample is described "Sir James Simpson's long forceps are here shown (fig. 88). The peculiarities are seen in the shape of the handles and in the hook at the top of each for the fingers to aid in extraction."

The finger-rest or flange so often associated with Simpson's forceps, was introduced many years before the days when that obstetrician flourished, by J. D. Busch. Kilian figures several old forceps besides those designed by J. D. and D. W. Busch with finger-rest, namely Fries' (pl. xxiv), where the "rest" is almost precisely as in Simpson's and where there are similar finger-depressions on the sides of the handles, also Muller's (pl. xxv), and Naegele's and Huter's (pl. xxviii). In Scholler's (pl. xxxii) the finger-rests are joined as in Levy's, preserved in this collection No. 51. Osiander and Kilian placed the flanges in the middle of the handles ; in Kilian's they were jointed as in Scholler's.

The deep finger depressions on the handles instead of the palm-rest, are first indicated in Brunninghausen's forceps. (Kilian, "Armamentarium" pl. xxiii) and in Fries's (Ibid. ; pl. xxiv), introduced at the beginning of the 19th century.

In the forceps devised by Evans (1784) shanks appear for the first time.

An elementary finger ring is seen in Mulder, pl. vi, fig. 11, of Van de Laar's second forceps.

SIMPSON'S LONG FORCEPS (II).

"A similar instrument, not so highly finished; the lock is of the simplest type. The steel forming the inner part of the handle is roughly chequered on the side corresponding to the concavity of the pelvic curve of the blades.

SIMPSON'S LONG FORCEPS WITH BRONZE BLADES.

"A highly finished instrument with bronze blades lined with smooth ebony with deep finger depressions and no distinct palm-rest. The bronze or inner part of the handle is smooth, being neither fluted nor chequered. Finger-rests wide. English lock, but with the clip omitted on the handle of the right blade. Characteristically long, almost parallel shanks, with wide space between them."

1848. Bourdeaux.

L. Rau described the folding forceps of Bourdeaux in Ztschr. f. Geburtsk. 1848, 377-384 1 pl.

1849. Baumers.

Baumers of Lyons reinvented Uytterhovens antero-posterior forceps. He evidently did not know of the latter's attempt 44 years earlier. As it was intended to be applied at the level of or above the superior strait, it is very long ; moreover the posterior branch is appreciably longer than the other. Neither of the blades has a pelvic curve but the inner has two curves on the flat, one above, to be applied to the head and the other below, to adapt itself to the symphysis pubes. The following account is reproduced from New Sydenham Society's Lexicon.

"Similar to those of Chamberlen, curved however not on the margins but on the flat, in such a way that one of the blades is concave and the other convex. The convex blade has a pivot, the other a hole. The curvature of the convex blade begins at the articulation and is uniform to the end. This blade is intended to occupy the cavity of the sacrum. The branch with the hole is shorter than the other and presents a double curvature on the flat, at first concave near the point of junction of the blades, so as to be adapted to the form of the

pubes; it becomes convex near the extremity that it may glide over the head of the fœtus." (See fig. 438).

1850. Jouet.

See C. Dubreuilh's paper on the forceps modifed by M. Jouet.

1850. (?) Hohl.

Dr. Anton Friedrich Hohl of Halle gives the following description of his forceps in his book:—"Lehrbuch der Geburtshulfe. 1855. Verlag. von Wilhelm Engelmann, Leipzig."

The tips of the blades are 5—6 lines apart. The total length of the forceps, is 15 inches, of which 6¼ inch is for the handle and 8¾ for the blades and shanks. The weight is 1 lb. 10 Loth. The handles were made of wood which can be made thicker and

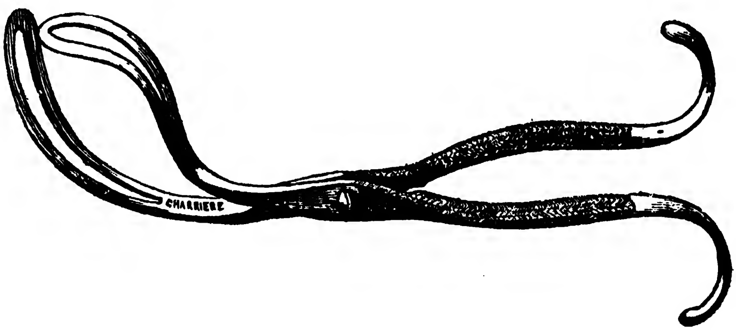


FIG. 438.
Baumer's antero-posterior asymmetric Forceps.
(Witkowski).

thinner to suit the grip of the individual operator. The lock is of the Smellie type. The blade is 1¼ inch wide in the upper part and 5/6 inch in the upper end, 2½ inches in the middle, apart from the other. The fenestra are not open. Each border is ½″ wide at the tip and made gradually narrow from shank to tip. The pelvic curve is such that when the forceps is laid horizontally, the tips are 3½″ for the horizontal line."

Hohl was born 17 Nov. 1794. He became privat-Doc in 1830 and Prof. in 1832 in Halle. On the death of Niemeyer in 1840 he became Director.

1850. Bond.

Dr. Henry Bond attempted "to give the branches of the forceps an accommodating rocking motion upon each other, the extent of which can be regulated at will and which shall in respect lessen the power of the instrument. The instrument has been called Bond's "sock-lock forceps".

The instrument will be seen to differ as a whole from any now in use; although no one of its modifications, except the lock has any claim to novelty. The handles are Dr. Siebold's with unimportant modifications. The blades are Dr. Davis's a little modified. Its whole length is about 15 inches and its weight about 15 ounces. The length of the handle is 6 inches and that of the blade 9 inches. It might be made somewhat shorter and lighter without impairing its power.

Of the Lock. In fig. 442 (the pivot of full size), the screw is of about double the diameter and nearly double the length of those in other instruments. This additional strength is necessary because the bearing point of the pivot is not immediately above the blade in which it is inserted (as in other instruments), especially when this bearing point is elevated so as to give the blades a free rocking motion. The *additional length* is required to give the screw a firm lodgment, when it is partly withdrawn from the blade. The thumb-piece is made to fit so close upon the female blade, but without resting upon it and is so thick and rounded that there may be no risk of injury should it ever happen to be brought into contact with the patient. The screw when well made will turn so easily that the thumb-piece may be made much less prominent than it is here represented. When the forceps is used, the thumb-piece should be placed *parallel with the blades*; otherwise it may interfere with the rocking motion. Between the thumb-piece and the screw the pivot is of the form of two *frusta* of cones of equal dimensions, united together at their smaller diameters forming an obtuse

FIG. 439.
Hohl's Forceps.
(Hohl).

FIG. 440.
Inner surface of
left blade of
Hohl's forceps.
(Hohl).

FIG. 441.
Outer surface of
right blade of Hohl's
forceps.
(Hohl).

angle or groove at their junction. The base of that cone joined to the screw projects a little, forming a shoulder intended to limit the motion of the screw into the blade.

The notch in the female blade made to receive the pivot, in relation to the edges of the branch, is nearly in the middle; yet the width of this branch, opposite to it, is swelled out, so as to give it adequate firmness. The width and the form of the *sides* of the notch are accurately adapted to those of the pivot and the *bottom* of the notch terminates in an edge, like the Knife-edge of a balance, which is intended to rest in and bear upon, the angle or groove in the pivot. On the under side of the male blade is seen a protruberance, finished so as to present no salient points. It is a shield for the extra length of the screw. When the pivot is screwed entirely down, the branches have no more lateral or rocking motion than those of any other forceps and in this condition, they will very generally be used. But by turning the screw, so as to elevate the bearing point, more or less freedom is given to the rocking motion, according to its elevation; and this motion is effectually restricted within any desired limits. When by means of this free motion the operator has been enabled to grasp the head he may sometimes change its position so that the clams may be then adapted to the head without the obliquity at first necessarily allowed to them by the elevation of the pivot; and then if desirable the pivot may be screwed down and the blades will become as fixed as those of other forceps."

"It will be seen that the *blades* of the forceps here presented (figs. 443-4), resemble nearly those of Dr. Davis. The shanks are considerably longer; the clams are not quite so long; the radius of their pelvic curvature is a little less, especially that of the outer limbs, so that it will be less liable to be obstructed by the promontory of the sacrum in passing the instrument above the superior strait. The fenestræ are wider in their middle and posterior part than those in most other forceps now in use. When the pivot is elevated, so as to allow the blades their rocking motion, this width becomes especially requisite in order to secure a firm hold on the head and to avoid the risk of their slipping sideways. The space between

Fig 1.

FIG. 442.
The screw of the lock of Bond's forceps.

Fig. 2.

FIG. 443.
Bond's Forceps.
(Side view).

Fig. 3.

FIG. 444.
Bond's Forceps.
(Front view).

(Amer. Jour. of Med. Sciences).

the blades is such, that, when applied to the head, the handles shall not be at a distance from each other, awkward and inconvenient to the operator. From the pivot the upper line of the shank continues forward, without any elevation or depression to the beginning of the pelvic curvature ; and the form and the relation of the shank to the clam are intended to be such as to interfere the least with perineum."

"It will be seen (Fig. 443) that the pivot is in a direct line between the handles and the centre of the fenestræ. This is a *point of importance* in those cases where the rocking motion of the blade may be required as it will cause each limb of the clams to press with nearly equal force, thus avoiding undue pressure upon any one part of the head and the liability to slipping or displacement."

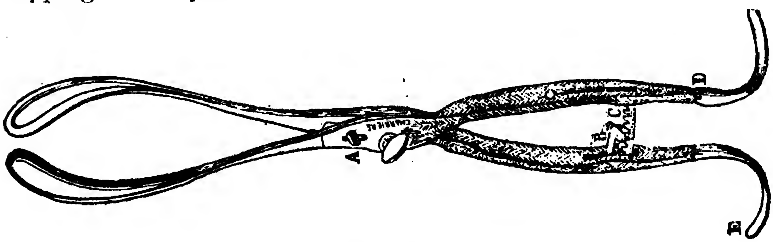


FIG. 445.
Dubois's Forceps (with a tooth-rack in handle).
(Witkowski).

"The handles are made partly of ebony and they resemble those of Siebold, although considerably lighter. The precise model of those represented in the illustration is not important; for it may be varied to suit the grip or the taste of different operators."

1850. (?) Dubois.

Paul Dubois modified Levret Forceps by providing it with lateral mortise. (See Figs. 402 and 409).

Another model was manufactured by Charriere with a tooth rack in handle. (See Fig. 445).

A third model is illustrated in Jetter and Scheerer's Catalogue, with jointed handles. (See Fig. 446).

Paul Dubois was the son of Antoine Dubois, who was senior Surgeon to the Maternite at Paris. His father caused him to be appointed Assistant-surgeon to that hospital in 1820. There he gained such experience that in 1825 his father retired in his favour and he became Professor and Senior Surgeon. In 1834 he was elected Clinical Professor, which appointment he held with distinction for 25 years. Being averse from writing he was not a voluminous author; nevertheless his memoirs on the "Mechanism of Labour" stands as an evidence that he was as adroit in the art of writing and as clear in description, as he was brilliant in lecturing. For nearly 12 years before his death, a veil came over his great intellect, which gradually becoming

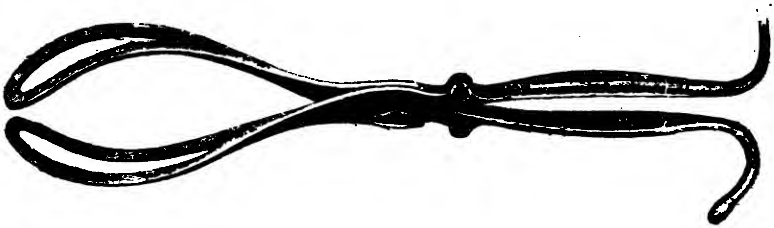


FIG. 446.
Dubois's Forceps. (Jointed).
(Jetter and Scheerer).

denser, and destroying one by one his many brilliant faculties, ended by annihilating them all and permitting only a vegetative existence. He died at the age of 76 at Courteille in 1871, of bronchitis.

1850. (?) Clarke.

The following is reproduced from Doran's Descriptive catalogue:—"A short curved forceps, each limb forged out of one piece of steel, nickel-plated, handles lined with smooth ebony, and greatly flattened antero-posterioly; in breadth they measure together when closed 2 inches (5 cm.), at the free end of their palm-rest, and taper upwards so as to be hardly $\frac{3}{4}$ in. (2 cm.) broad at the lock, where there is no shoulder. The inner surface of the left handle at the level of the palm-rest

bears a stout blunt pin, fitting into a hole in the corresponding portion of the opposite handle. The blades have no shanks but bear a marked pelvic curve, their inner surfaces, which border the fenestræ, are perfectly plane and their edges are well rounded. (See Fig. 447).

Clarke's instrument was one of the very light short forceps in use in the middle of the 19th century, where the

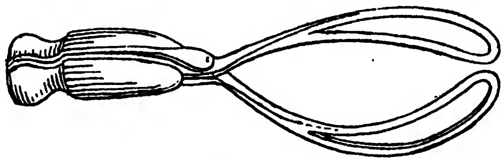


FIG. 447.
Clarke's Forceps.

blades bore a pelvic curve. The pelvic curve sufficiently distinguished it from Denman's better known instrument, a short forceps with straight blades."

For measurements see Appendix .

1850. Ziegler.

His instrument is very like Denman's short forceps with the exception that the fenestrum of the lower blade is continued

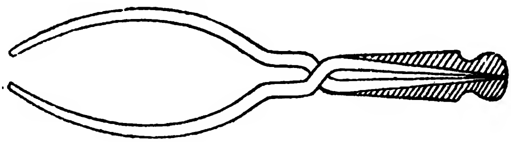


FIG. 448.

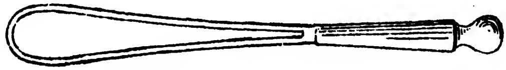


FIG. 449.

Ziegler's Short Forceps.
(Witkowski).

to the handle. The lower blade is introduced by slipping its long fenestra over the handle of the other one, already in position. They possess a short shank before the springing of the curved blade.

SECTION VI.

NINETEENTH CENTURY.

(THIRD QUARTER)

1853. Sauve de la Rochelle.

This forceps was shown at the Acad. de Med. of Paris on 1st February 1853. It had the advantage of being articulated above or below, as desired.

1853. Bethell.

Dr. J. P. Bethell, formerly Physician to the City Hospital, Philadelphia, constructed a forceps "upon Philosophical principles"'.* He was of opinion that a "properly constructed forceps should adapt themselves equally well to the maternal pelvis and fœtal cranium; in other words the external outlines should harmonise with the curves of the female pelvis, whilst the internal form and dimensions should accord with the head of the child; at the same time the instruments should have a sufficient length to allow the blades to pass entirely above the superior strait or brim of the pelvis, whilst the lock remains entirely outside of the external organs.

Instruments founded upon these principles operate in the axes of all the planes and straits of the pelvis, whether adjusted above the brim, in the excavation or at the outlet; always equidistant from sacrum and pubis, the blades naturally and of necessity follow the central curve of the pelvic cavity (the circle of Carus) and as a consequence operate in the axis of each particular plane and strait through which they may be passing. The cranial faces of the blades should fit the child's head closely and yet a sufficient amount of room must be allowed to prevent the possibility of undue pressure being made upon it; when

*American Journal of the Medical Sciences, July, 1853 (p. 116) with a plate.

adjusted (if the curves be properly formed) the grasp is so perfect that slipping is out of the question; another and very decided advantage is, that meeting the head flatlong, there is no risk of indenting the skull or cutting the scalp. In the elegant short forceps invented by Dr. Davis of London, the lesser and greater curves are in unison with the pubic and sacral circle segments of the pelvic canal; but in consequence of the shortness of their shanks, they cannot be applied when the head is arrested at the superior strait; besides the lock is greatly inferior to Siebold's; and again the curves of the cranial faces are not in accordance with the convex form of the child's head.

The long instruments of Levret and the almost numberless modifications of them, French as well as German, comply with neither the pelvic concavities nor to the cephalic convexities. In consequence of their inadaptation, the child is often mutilated or destroyed and the mother subjected to the most serious or even fatal injuries. The blades being not less than 3 inches longer than the longest cranial measurement cannot fit in the long or Occipito-mental direction; the fenestra are too narrow to allow the parietal protruberances to pass through them; and the concave face, in the transverse or sacro-pubic direction, is not the segment of a circle whose diameter is $3\frac{1}{2}$ inches. The sacral and pubic curves bear no relationship to the cavity for which they were designed."

After describing a pair of Baudelocque's forceps in his possession, the author described his new forceps. "Their entire length is $16\frac{5}{8}$ inches; the measurement in straight line from tip of the blade to shank, $6\frac{1}{4}$; length of shank from the cavity to centre of the lock $3\frac{1}{4}$; handles from centre of the lock to extremities 7 inches; the radius of the sacral curve about $3\frac{1}{4}$ inches; radius of pubic curve near 4 inches; extreme width of the blade $1\frac{7}{8}$ inches; fenestrum $1\frac{3}{8}$ inch in width and $4\frac{3}{4}$ inches in length.

The cephalic cavity with the handles closed, measures from blade to blade at the parietal portion that is near the base $2\frac{1}{2}$ inches but in consequence of the bilateral or parietal curve, it really measures at the centre 3 inches, at the temporal part

2 inches and at the tips ½ inch. This gives the occipito-mental curve, which has a radius of about 5½ inches. The bilateral or parietal curve from the outside of the pubic to the outside of the sacral edge has a radius of 1¾ inch; the rim of the blade is 5/16 inch wide and scarcely 1/16 inch in thickness at the apex, gradually becoming thicker towards the base; the face of the rim is turned slightly off at the very extremity. The *shanks* take their origin from the superior rims of the blades and by means of a twist at their junction, the upper is made to ride over the lower and to be directly in contact with it. This allows the blades throughout their entire length, to remain parallel and the screw prevents any twisting. By this arrangement the blades are thrown into the cavity of the pelvis

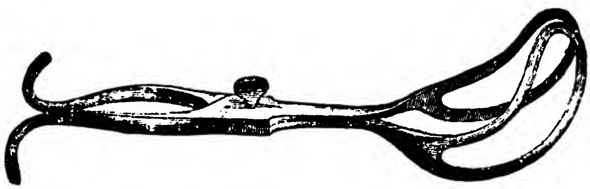


Fig. 450.
Bethel's Forceps.
(Tiemann).

without the perineum being pressed upon by the shanks; the advantage is obviously increased in all operations above the brim. The shank, at its junction with the blade is ⅗ inch wide, increasing towards the lock where it is one inch. Each shank is ¼ inch thick and when in contact the two measure ½ inch; consequently when the blades are adjusted, the room occupied at the vulva is about ½ inch in every direction. Placed on a horizontal plane, the extremities of the blades have an elevation of 4 inches; weight less than 17 ounces. In their pelvic curves and in the sacropubic width, as also in weight of metal, the blades resemble Dr. Davis's; the shanks are not unlike Dr. Hodge's; the lock is Siebold's; the cramial curves, I believe, differ from all others.

The handles form a very obtuse angle with the shanks, by which means the power is expended in a proper direction.

Their obvious advantages are that they always fit the female pelvis and the head of the child with greater accuracy than any other instrument in use. They never operate in a false axis but always follow the pelvic centres. (See fig. 450).

1853. Naegele.

The forceps of this celebrated accoucheur had the greatest success and has been in general use in Germany. Its constituent elements were borrowed from the instruments of Brunninghausen (1802), of Fries, of Mende and of Kilian.

It resembles that of Levret, but differs from it in the handles being short, covered with wood and terminating by two rounded processes which have a groove; near the articulation is a lateral notch and a tenon fixed by a screw.

The following description is translated from French from Pinard's article on forceps in Dictionaire Encyclopædic des Sciences Medicales, 4th Series, 3rd Vol., p. 531.

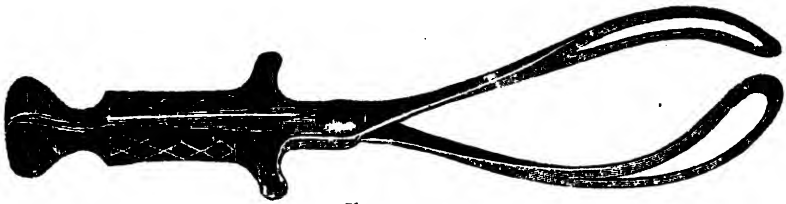


FIG. 451.
Naegele's Forceps.
(Jetter and Scheerer.)

Naegele's forceps is a modified Brunninghausen. Its weight is 652 grms. Its length 379 mm. according to Naegele and Grenser. The length of the blades is 250 mm. (Scanzoni) or 230 mm. (Naegele and Grenser). Their greatest width not far from the extremities is 41 mm. This width gradually diminishes, until the articulation is reached. When the blades are closed, they make an angle of 39°, immediately above the point of junction, and they remain separated at the tip by 7 mm. (Scanzoni) or 11 mm. (Naegele and Grenser). The greatest width of the sine formed by the blades is at a distance of 67 mm. from their extremities and measures 67 mm. The

blades are fenestrated; the edges of their internal surfaces are slightly rounded; their width is 7 mm. and their thickness 5 mm. The pelvic curve commences from the articulation and when the instrument is placed horizontally the tips of the blades are 94 mm. above the horizontal plane.

The handles of the instrument are made of metal, with a covering of wood. At their lower ends they terminate in two rounded knobs, with a deep groove above them, which give the hands placed on the handles, at this point, a suitable support during traction. Towards the upper part of the handles, about 20 mm. from the point of articulation, there is a lateral projection on each of them, in the form of a curved cross, with a concave upper surface which facilitates articulation of the branches and traction.

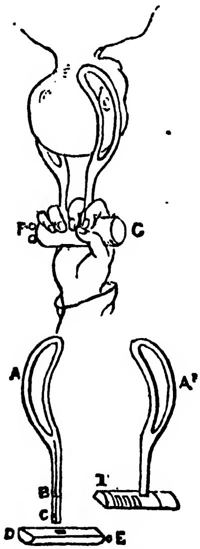
The articulation is so constituted that the branches could be locked and separated easily. The left branch carries a pivot surmounted by flattened head, which fits into a notch in the female branch, which becomes covered over by the head of the pivot, when the branches are locked. The mechanism of articulation is remarkably facilitated by the presence of inclined planes, the highest points of which rest against the pivot. (See fig. 451).

1853. Mattei.

Mattei presented to the Academy of Medicine on 24th June, 1853, a new obstetric tractor called "Leniceps" (or the soft forceps) as opposed to the ordinary forceps (which according to him was derived from "Forte," *i.e.*, strongly and "capere" to seize). Mattei was strongly of opinion that the forceps always compresses the head and that this compression becomes all the more dangerous for the child as the handles of the instrument are tightened. This instrument is composed of two branches, which were at first introduced and then articulated, in a fixed and symmetrical manner, on a transverse bar of wood which has some mortises meant for receiving the stalks at various distances. The blades have the single cranial curve which accurately fits the cranium. The curve is therefore great.

The blades and stalks are very short. The advantages claimed are. (1) Its moderate size enabling the accoucheurs to use it without the knowledge of the patient. (2) The blades being more curved, the tissues of the mother are less liable to dragging. (3) The head cannot be exposed to compression. (4) It does not require the help of an assistant for introduction.

The principal advantage of this instrument seems to be the adaptability of the hand of the operator to the transverse handle. The instrument however has the great disadvantage of allowing with difficulty only the employment of leverage movements during disengagement of the head.



FIGS. 452-4.
Mattei's Leniceps.
(Cat. Obs. Soc. London).

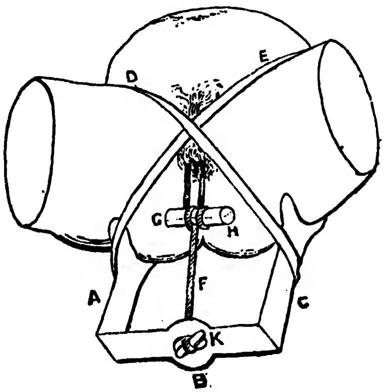


FIG. 455.
Mattei's Framework of steel for prolonged and forcible traction.
(Cat. Obs. Soc. London).

The instrument has been used very little in practice.

The following description is reproduced from Obs. Soc. Cat., p. 96.

"Mattei's Leniceps or short curved forceps." (See fig. 452-4).

(A) represents the left blade, (B) the shank, the corner extremity of which (C) slides into the hole in the lower half of

the handle (D), where it is fixed by a spring pivot running from E. to D. A. The right blade fastened into the upper half of the handle, at the inner extremity of which are several steel notches (I) for the reception of the opposite shank (B), by which the distance between the blades can be regulated. F. G. shows the upper and under halves of the rough wooden handles joined, the application of the instrument to the fœtal head and the method of traction.

Mattei's leniceps come within the principle of Assalini's and Lazarewitch's forceps—the blades not crossing and therefore not exercising compressive force.

Where prolonged and forcible traction is required M. Mattei has constructed a square framework of steel A. B. C. (fig. 455), having on both sides, at its upper extremities, two excavations for the reception of the patients' thighs, to the under surface of which the apparatus is to be firmly secured by straps (D. E.) crossing in front of the pubes and passing over the hips to the back where they are to be fastened. (See fig. 455).

The leniceps being applied M. Mattei attaches a rope (F) to the transverse handle (G. H.) while the other end is fixed to the screw (K), by turning which forcible traction upon the forceps can be effected over a considerable period.

1855. Mattei.

Mattei published a description of his large asymmetric forceps in 1855. The two branches are symmetrical and are not articulated. An independent piece serves the purpose of uniting the branches in such asymmetrical manner as the operator may desire.

The junction of the two branches is made by means of a socket hollowed in a canal (L) and in a groove (H). The canal and the groove have the dimensions of the handles of the forceps and are each of them provided with a tightening screw (F and G), to prevent movement.

The branch of the forceps which should remain at the back, in the canal of the socket (B) is introduced in a manner that the groove is placed in front. The branch which should come

forward is then placed in the groove of the socket. Finally the screws of the socket are tightened. The forceps have therefore a movable articulation which can be made a fixture whenever necessary and which can be done without the branches being parallel.

The following description is quoted from Obs. Soc. Cat., p. 97:

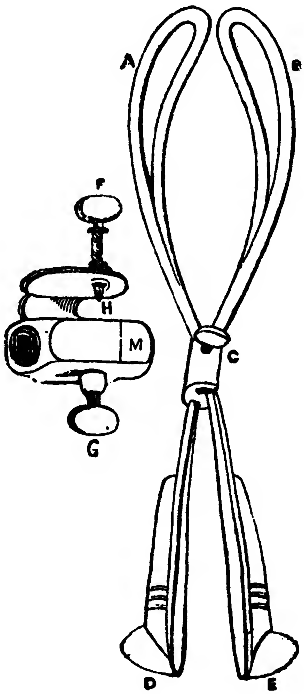


FIG. 456.

Mattei's Long Curved Forceps, with movable articulation and lock for uniting the branches in asymmetrical manner. (Cat. Obs. Soc. London).

"Mattei's Long curved forceps, with movable articulation and lock, 1855, are represented in fig. 456."

A, B, C, D, E represents the instruments articulated. F, G, H, L, M, represents the articulation. The blade (B, D) is received into the hole (L, M) and moves along it, unless

arrested by the screw (G). The blade (A, E) is received into the groove (H) and there fixed by the screw (F). At C the lock is seen fixed; the movable screws (F and G) admit of the lock being moved up or down the blades.

1855(?) Hugenberger.

Theodor Hugenberger was born on June 1st, 1821 in Kurland. In 1842 he entered the University of Dorpat and took his degree in medicine in 1847. In 1857 he was ordained Professor of Midwifery and Physician-Accoucheur to the Lying-in and Midwives Institute of the Grand Duchess Helene Pawlowna in St. Petersburg. In 1872 he was appointed Director of the Imperial Lying-in Establishment of the Moscow Foundling Institution. He remained in the occupation of that post until 1887 when he retired and went to his native place. He died on June 29th, 1891, at the age of 70 at Majorenhof.

He was an honorary fellow of many medical societies. He was noted as a teacher and as a voluminous writer on obstetrical subjects.

He paid several visits to England and came expressly from Russia to see the Exhibition of obstetrical instruments, held by the Obstetrical Society of London. He showed his own long forceps which had the peculiarity of being shorter in the curved portion of the blade than any other European forceps exhibited. The blade-bow measured in the straight $5\frac{1}{2}$ inches only, while Van Huevel's, which was the longest in the Exhibition measured 10 inches. There was a Japanese forceps shown which measured in the bow of the blade $4\frac{3}{8}$ inches only.

No illustration of his forceps is available. For measurements see appendix.

1855(?) Nivet.

A sample of Nivet's forceps was exhibited at the conversazione of the Obstetrical Society of London. No description or illustration is given. For measurements see appendix.

1855(?) Scholler.

No description is available. An illustration from Kilian's Armamentarium is reproduced in Fig. 406.

1855(?) Cederschjold.

A sample of this forceps was exhibited at the conversazione of the Obstetrical Society of London. No illustration is available. For measurements see appendix.

1855(?) Bird.

Dr. Frederick Bird (1818—1874), Lecturer on Midwifery and Diseases of Women in the Westminster Hospital School of Medicine and Senior Physician to the Westminster Maternity

FIG. 457.
Bird's Forceps.
(Cat. Obs. Soc. London.)

Charity, London, constructed a forceps with unusually wide and rather short fenestræ, long shanks and a ring just above the handles, formed by the opposed shanks, for the finger to facilitate in the process of extraction. A sample of this forceps was exhibited at the conversazione of the Obstetrical Society of London. For measurements see appendix. (See fig. 457).

1855(?) Oldham.

Henry Oldham was born in 1815. He received his medical education at Guy's Hospital and in 1849 he was appointed Physician-Accoucheur and Lecturer on Midwifery and Diseases of Women at Guy's. He held this appointment for 20 years. He was a remarkable personality and an eminent obstetrician. He lived to a ripe old age, which had been attributed to his taking a very small amount of food and this of the simplest

character. He died in 1902. He constructed a long forceps which was of the usual Simpson type, but the handles were thicker, straight, smooth with square tops. For measurements see appendix. (Vide fig. 458).

1855(?) Walter.

A sample of this forceps was exhibited at the conversazione of the Obstetrical Society of London. For measurements see appendix. No description or illustration is available.

1855(?) Lever.

C. J. W. Lever was born at Woolwich, where at the usual age he was apprenticed to Mr. Butler, a gentleman in extensive practice. He then entered as a student in Guy's Hospital. At the end of his hospital studies, in 1834 he became a member of

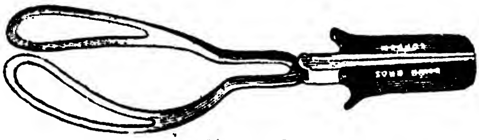


FIG. 458.
Oldham's Forceps.
(Down Bros.).

the Royal College of Surgeons of London and commenced general practice in the Borough and while residing in this locality, he took an active part in organising the obstetrical department of Guy's Hospital and there laid the foundation of a flourishing school of Midwifery. In 1849 Dr. Lever and Dr. Oldham were admitted together upon the staff of Guy's Hospital. He died on 29th of December, 1858. He contributed to the 'Guy's Hospital Reports' a series of researches on the presence of albumen in the urine in cases of puerperal convulsions.

The following notes from Doran's Descriptive Catalogue, describing a straight long forceps by an unknown designer (No. 38), are inserted here as having a reference to Lever's forceps:—"This is an old type of straight, long forceps,

apparently earlier than Blundell's. The blades, narrowest at the tips and perfectly flat on their inner surface resemble those of the Orme-Lowder instruments but the shanks are very long and convex outwards, suggesting a compromise between the Ramsbotham-Simpson parallel shanks, originally made by Evans of Oswestry or Aitken, and the Greenhalgh and Barnes finger-ring, originally devised by Hopkins (see No. 37), although indicated in Van de Laar's second forceps. It bears a considerable resemblance to Greenhalgh's forceps, but the fenestræ are narrower and the finger ring is rudimentary. (See fig. 459).

In Maw and Thompson's Book of Illustrations to their quarterly Price-current, January 1870, a similar instrument is figured "Lever's," together with another more often associated with Lever's name.

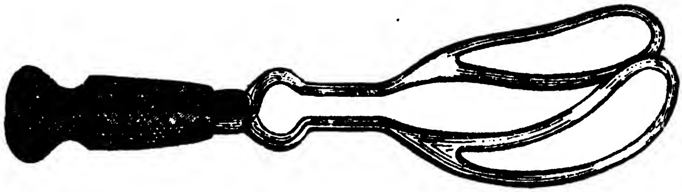


FIG. 459.
Lever's Forceps.
(Weiss).

1855(?) Campbell.

Charles James Campbell died in Paris on the 23rd of June 1879, aged fifty-nine. He was of purely English extraction, having been born at Stapleton Park, in the county of York but his parents went to France when he was six years old and he was entirely educated in that country. Practically therefore by residence and education, he became French. After his medical studies were completed he became an Interne at the Paris Hospitals and in 1846 was appointed Chef de Clinique under Dubois at the Maternite. The starting point of Dr. Campbell's success was his early adoption of anaesthesia in midwifery (1849). During the Franco-Prussian war, Campbell resided in his country-house near St. Cloud, after all the neighbouring residents had left, and occupied himself so strenuously in the

endeavour to prevent the pillage of the deserted houses, that he was arrested by the Prussians and was on the point of being shot, when he fortunately was saved by the fact of the Prussian General before whom he was conducted. being the husband of an old patient of his, to which happy accident he owed his escape. During the later years of his life, Dr. Campbell was compelled from ill-health to retire from practice. He died unmarried, after a comparatively short illness from peritonitis.

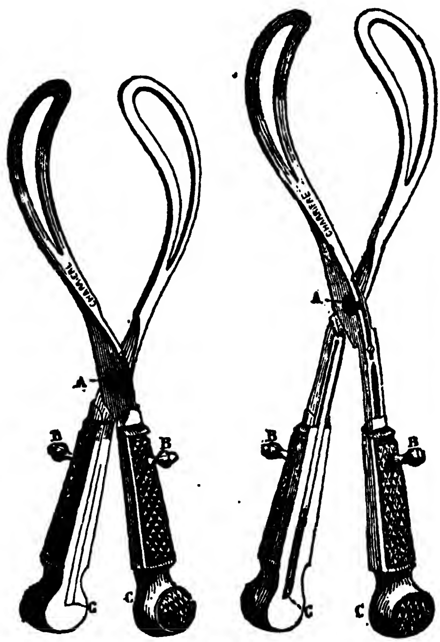


FIG. 460. FIG. 461.

Campbell's Forceps.
(Witkowski).

The instrument of Campbell of Paris approaches the type of Asymmetric forceps. It has handles which may be lengthened equally or unequally by means of a groove, the difference being about 7 cm. "The peculiarity of this instrument is that it can be used either as short or long forceps by

means of shanks which slide into handles and can be firmly fixed to any length by a catch on the upper and outer parts of each handle, which may also be used as finger-rests." The instrument can thus be lengthened, shortened or made asymmetric. For measurements see appendix. (Vide figs. 460-1).

1857. Valette.

Valette, Chief Surgeon of Charite de Lyon exhibited a modified (parallel) Thenance forceps before the Academy of Medicine on 14th July, 1857. The forceps is smaller and is modified, to substitute a kind of sliding ring for the napkin, so as to hold the branches together by a good form of articulation, called the bayonet articulation. (See fig. 462).

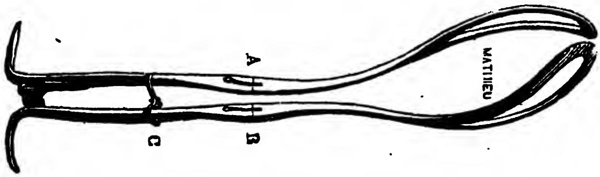


FIG. 462.
Valette's Forceps.
(Mathieu).

1858. Elliot.

George, J. Elliot Jun. M.D., of New York describes a new midwifery forceps. In order to obviate compression upon the child's head, he has contrived a sliding pivot, which is easily moved along the handles, admitting of being fixed so as to keep the handles at any desired distance apart. With this pivot it is of course impossible by any amount of pressure on the handles, to approximate the blades beyond the point at which they are separated by the intervening head.

In order to render the forceps applicable in a greater variety of cases, especially when the head is floating above the pelvic brim and when even the os is undilated. Dr. Elliot prefers, with some modifications, Dr. Simpson's form. The instrument he describes is $15\frac{1}{4}$ inches long; extreme width

between blades $2\frac{11}{16}$ in.; length of blades which have a slight pelvic curve, $6\frac{3}{4}$ in.; the width of the fenestræ only 13/16ths of an inch. The blades are very thin, the handles long and powerful.

The following description appears in Stedman's Reference Handbook of Medical Sciences—Article, "forceps." It is fifteen and a half inches long, two inches longer than that of Simpson, $9\frac{1}{2}$ from the lock to the tip of the blades, $\frac{7}{8}$ inch between tips of the blades, $\frac{1}{4}$ inch less than Simpson's and $2\frac{3}{4}$ inches at the widest part of the cephalic curve, $\frac{1}{2}$ inch less than Simpson's. It also has a screw and pin in the end of

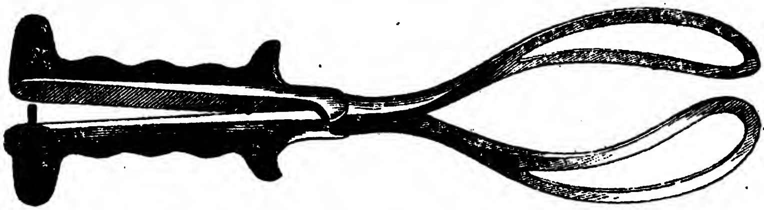


FIG. 463.
Elliot's Forceps.
(Tiemann).

the handles which can be drawn out as a means of regulating the lateral pressure on the handles when the instrument is in position for use." (See fig. 463).

1860. Knight.

Samuel. T. Knight of Baltimore constructed a new pattern forceps which have a lesser pelvic curve, no fenestra and smaller blades. They taper more gradually from the handles to the blades and the blades are more convex especially near their termination, Finally the blades are more narrow, rendering their introduction simpler. All these seem to be great advantages.

Dr. Knight draws attention to the following objections in the construction of the forceps. (1) The pelvic curve is greater than necessary, according to the laws of mechanics. (2) The suddenness of the curve, with the fenestra beyond, demands too great an amount of metal at the point of curvature. This is

the precise spot where the greatest volume of the head is brought in contact with the perineum, which is thus torn. (3) The large size of the fenestra allows too free a protrusion of the foetal cranium through them, the biparietal diameter is thus little reduced. (4) The Fenestra increases the breadth of the blades more than is convenient or necessary. (See fig. 464).

To adapt the pelvic curve of the forceps to the axis of the cavity of the bony pelvis and its outlet, is obviously fallacious. The fenestra are not only useless but injurious. They weaken the blades and render them more likely to slip. Moreover the protrusion of the soft parts through them increases the resistance more than the polished metallic surfaces of the plain blades.

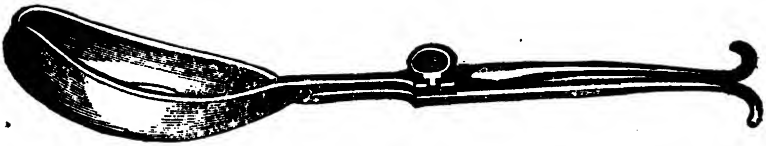
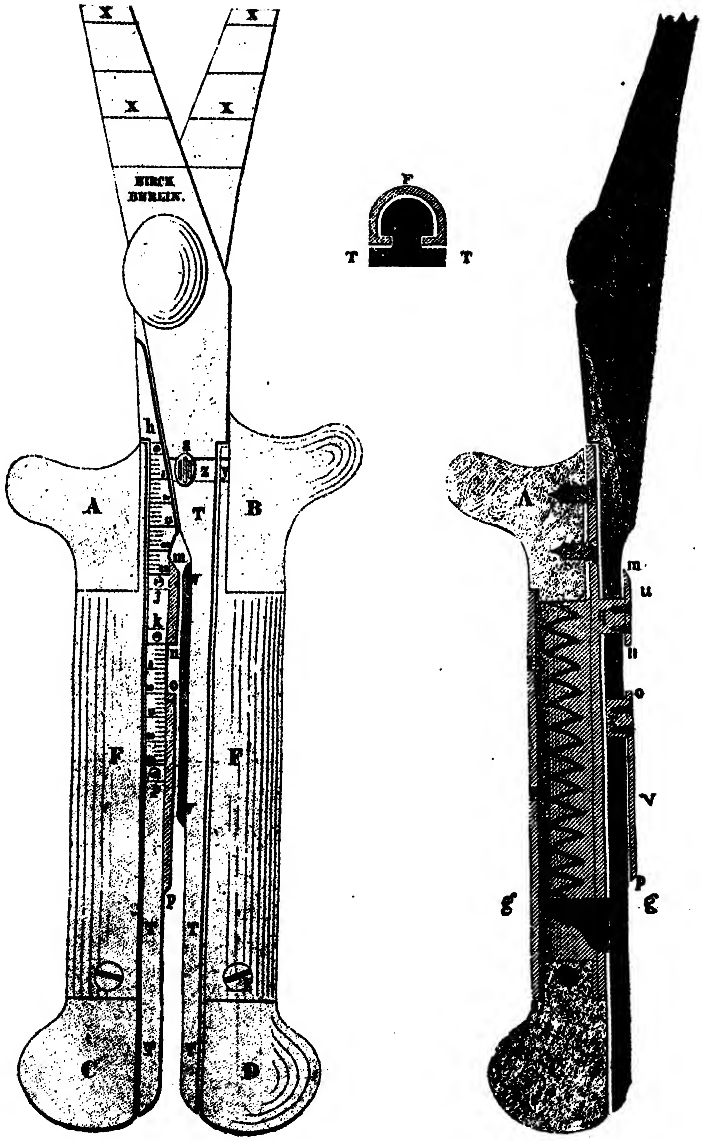


FIG. 464.
Knight's Forceps.
(Braithwaite's Retrospect.)

With plain blades, it is impossible for the forceps to slip. Moreover, the breadth of the blade of the plain forceps and the moulded convexity of their interior face, which adapt them accurately to the arch of the cranium, entirely prevents any cutting or mutilating of the foetal scalp. In the gradual taper from the handles to the blades they approach more nearly to Dr. Smellie's forceps and at this point give a decided advantage. For measurements, see appendix.

1860. Kristeller.

Dr. Kristeller submitted to the Berlin Obstetrical Society, a contrivance by means of which the exact degree of extractile force employed in using the forceps may be measured. The instrument is somewhat complicated. The dynamometrical apparatus is adapted to the handles. Each handle consists of two parts, one movable the other fixed. The fixed part (T) is a strong steel plate which forms the continuation of the fenestra.



FIGS. 465-7.
Kristeller's Forceps.
Showing the dynamometrical apparatus adapted to the handles.
(Kristeller).

The movable part (F) is a half cylinder of brass which is so adapted by its plane surface to the steel plate that it can ride freely up. and down, but in no other direction. Above, the brass half-cylinder is closed by a projection (A. B.) forming a notch in which the fingers of the operator are hooked for power of traction ; below, the cylinder ends in the ordinary dilatation (C. D.) for the hand to rest upon. Within the half-cylinder lies a strong steel spiral spring which presses above against the prominences which support the operator's fingers (A) and to which the chief part of the extractile force is applied and below is fixed immovably to a projection (E) from the steel plate. When the operator pulls with his right hand upon the upper prominence and with his left upon the shafts of the handles, he draws the movable half-cylinders down, compressing the spiral springs the elasticity of which serves to measure the force employed. This is indicated by a graduated index (hi) adapted to the handle below the lock. The graduations are in millimetre and the load is measured in terms of zoll-pound. Thus when the scale shows 17 mm. compression of the blades, it means a force of 50 zoll-pound.

There is a second scale *kh* which moves a brass plate *op* which indicates the maximum height of the pull. To each handle there is a projecting regulator *z* which is fixed by a knob *s* which allows the fixed and movable portions of the handle to be united together. The projecting regulator of the right branch lies above and that of the left lies below and both of them can be easily opened and closed by light movement of the thumb and index finger. The weight of the forceps is 1⅛ pound. (See figs. 465—7).

The following description of Kristeller's Dynamometrical Forceps, is reproduced from Doran's Descriptive Catalogue.

"A long forceps with German lock, the pivot made "untrue" to allow of the utilizing of the metre scale on the handles. The metal of each handle is covered outside with a movable wooden portion bearing a palm-rest below and a flange or finger-rest above, whilst between them the outer surface is coated with brass.

Each of the wooden handles has a slide catch immediately under the finger-rest, which when drawn back (*i.e.*, unlocked) allows the handle to be brought down to the desired degree. When the grasp is released, the handle returns automatically to its normal position by means of a spring concealed in its interior. On the inner side of the handle of the left blade, a sliding-block with a stop is fitted; this block can be moved to the level of the mark on the scale, indicating the desired degree of pressure. The slide catch having been released, the handles can be drawn down to the extent of the scale exposed by the sliding block. A small fixed block higher up on the handle arrests the action of the sliding-block, thus showing when the limit has been attained. On the inner side of the handle of the right blade is a fixed block to allow of the free working of the sliding-block on the opposite side and a screw on the inner side of each handle near its extremity, serves the same purpose.

The blades bear a strong pelvic curve, and are stout and slightly convex on their inner surfaces, the fenestrae are relatively short and narrow. The lower half of each blade is marked with a centimetre scale to indicate, when traction is made and the head is low in the pelvis, the depth to which the blades are inserted. For measurements see appendix.

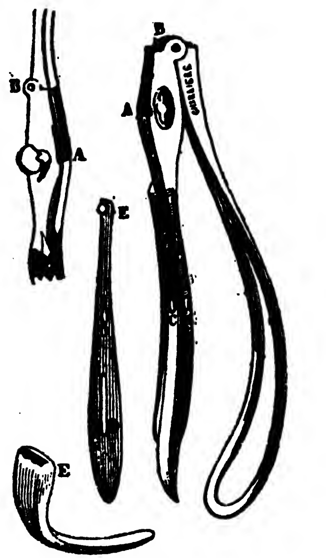
1860(?) Charriere.

Charriere, the instrument maker of Paris invented a jointed forceps, which was exhibited at the conversazione of the Obstetrical Society of London. He stated, "The method of dismounting these forceps is very simple and solid and permits also of the adaptation of the blades of various forms and sizes without augmentation of volume. See Charriere's catalogue, p. 120, fig. 309." For measurements see appendix. (See figs. 468—72).

1860(?) Comstock.

Comstock of St. Louis constructed a pair of forceps, the blades of which had well marked pelvic and cephalic curves,

whilst the fenestrae were very wide. The shanks diverged near the articulation to form a groove, for receiving the finger during traction. The lock was of the English type while the steel handles were of the French type. A sample of this forceps was exhibited with 16 others at a meeting of the Philadelphia Obestetrical Society on June 26, 1872 by Dr. Robert P. Harris. (American Journal of Obstetrics, Vol. V., p. 341). (See fig. 473).



FIGS. 468—471.
Charriere's Jointed Forceps with cranial perforator and its sheath. (Witkowski).

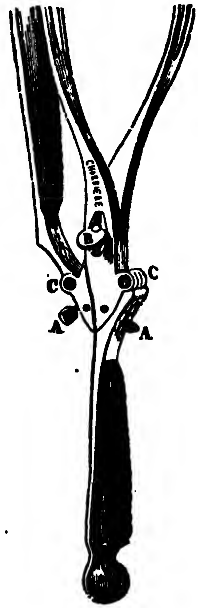


FIG. 472.
Charriere's Forceps.
Jointed handle.
(Witkowski).

1860(?) Depaul.

Jean Henri Depaul was born on July 26th, 1811. He became a pupil of Prof. Paul Dubois in 1832. His first hospital appointment was at the Hospital des Enfants Assistes, where he remained until his election as Professor of Obstetric Medicine in 1862. He was a man of prodigious activity which he showed

from the commencement of his career by the numerous works which he published, the thorough preparation he made for the various meetings he had to attend and by making a practice which rapidly became considerable. He performed operations

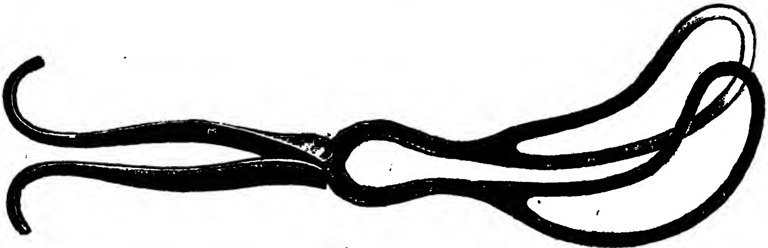


FIG. 473.
Comstock's Forceps.
(Richard Kny & Co.)

admirably and made an excellent diagnosis. He was in general little given to new methods. He only accepted them when they stood the test of time. He never used any forceps but the 'forceps classique'. His reputation was universal and received at the Clinique medical men from all lands. He died in 1883 at the age of 72.

He constructed a forceps with either superior or inferior articulation. (See fig. 474).

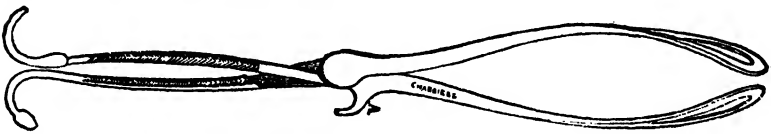


FIG. 474.
Depaul's Forceps.
(Witkowski).

1860(?) Duncan.

James Mathews Duncan was born in April, 1826, at Aberdeen. Having commenced the study of Medicine at Marischal College, Aberdeen, he continued it at Edinburgh. Later, he spent some time in Paris and made use of the large opportunities for observing necropsies, thus laying the foundations of his extensive knowledge of the pathology of the

puerperal state. Then he returned to Aberdeen to take the degree of M.D. in 1846, at the age of 20. The event which decided what special branch of the profession he should follow was his appointment in 1847, as private assistant to Sir James Simpson, who was at that time engaged in experiments with ether and other substances as general anæsthetics. It is a well-known story how Mathews Duncan was the first person ever rendered insensible by chloroform and how Simpson himself and Keith subjected themselves to the same experiment on the same night. Four years later, on ceasing to be Simpson's assistant, he commenced private practice in Edinburgh. He became lecturer on midwifery and diseases of women and children Surgeon's Hall, Edinburgh and rapidly gained success in practice but from the first devoted a large amount of time and labour to research and literary work. In 1861 he was appointed Physician for the Diseases of Women to the Royal Infirmary and it was in this position that much of his research and teaching was carried on. He was elected an Honorary fellow of the Obstetrical Society of Edinburgh in 1862. A similar honour was conferred upon him in later years by a large number of societies on the continent and in America.

On the death of Sir James Simpson in 1870 it was generally expected that Dr. Matthews Duncan, who had already a European reputation as one of the greatest obstetricians of any time, would succeed to the chair of Midwifery in the University of Edinburgh. The choice of the electors, however, fell on Dr. A. R. Simpson. This event had doubtless much to do with the result that he accepted the post of Obstetric Physician and Lecturer on Midwifery to St. Bartholomew's Hospital when it was offered to him on the retirement of Dr. Greenhalgh in 1877.

Dr. Mathews Duncan threw himself with characteristic ardour into his new sphere of work. His outstanding qualities soon brought him a very large practice but he could still find time for much scientific work.

He was a voluminous writer and an ardent investigator. He became President of the Obstetrical Society of London in 1881. He was the recipient of Honorary Degrees and distinctions

of numerous Universities and Colleges. He was a fellow of the Royal Society of London and Edinburgh. He died on 1st September, 1890.

He modified Simpson's forceps by making the handles shorter and covering them with chequered wood. The shoulders near the articulation in Simpson's forceps were also omitted. For measurements see appendix. (See fig. 475).

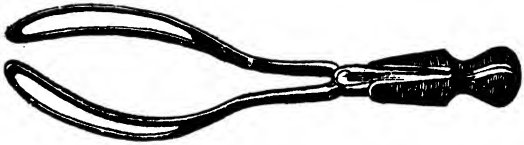


FIG. 475.
Duncan's Forceps.
(Arnold and Sons).

1860(?) Giles.

A sample of this forceps was exhibited at the conversazione of the Obstetrical Society of London. The following description is copied from the catalogue of the Society.

"Dr. Giles' Forceps are short and curved with a hinge adapted to the upper blade in such a manner that when they are locked the tail of the blade which is hinged, is shut into the lock, and the blades cannot possibly shift until they are unlocked. The lock is formed in the usual manner on the blade that is hinged with a flange forming a groove half an inch deep. The lower blade has no flange. The advantage in the hinge in the upper blade, is, that the handle is thrown forward, and the blade can be introduced without altering the patient's position in the bed, of course presuming she is lying in the ordinary obstetric position."

For measurements see appendix. No illustration is available.

1860(?) Hardon.

Hardon's modification consisted in adapting a fixed pivot to the male and a narrow (button?) to the female branches. A

sample of this continental forceps was exhibited at the conversazione of the Obstetrical Society of London. No illustration is available.

1860(?) Harper.

Philip, H. Harper F.R.C.S. was an original fellow of the Obstetrical Society of London. He died on November 29th, 1883. In alluding to his death the President remarked. "Mr. Philip Harper may be fairly regarded as one of the pioneers in the movement, which placed the forceps in the first position as at once the most important and most trustworthy of our resources in the management of lingering labour."

FIG. 476.
Harper's Forceps.
(Obs. Soc. Cat.).

He constructed an instrument which is peculiar in this respect, that one blade has a fenestrum so long that the opposite blade can be passed through it. The form of lock was that of Ziegler's. The handle was of ivory, straight and rough with finger-rests. For measurements see appendix. (See fig. 476).

1860(?) Hennig.

"The inventor of this continental forceps stated that his instrument was constructed on three principles embodying—(1) The pelvic Curve of Joerg's forceps. (2) The shank of Dr. Hohl, to avoid too great stretching of the perineum. (3) The hooked handles copied from the forceps of the Prague School." In the sample exhibited at the conversazione of the Obstetrical Society of London the handle was of wood straight and smooth. No illustration is available.

1860(?) Hoffman.

A sample of this continental long forceps with shank and ring for finger or handkerchief, was exhibited at the conversazione of the Obstetrical Society of London. No illustration is available.

1860(?) Japanese.

The following note appears in the Obstetrical Society's catalogue:—

"The Japanese forceps are chiefly remarkable for the shortness ($4\frac{3}{4}$ inch), narrowness of ($\frac{3}{4}$ inch) and distance ($1\frac{3}{4}$ inch) between the blades, also for the straight fenestra.

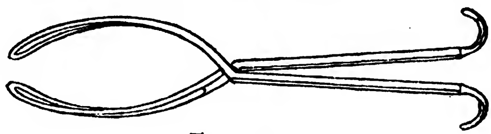


FIG. 477.
Japanese Forceps.
(Witkowski).

The lock is peculiar being formed by an aperture $\frac{1}{4}$ inch in length and the same in depth slanting upwards in each limb of the instrument at the junction of the blade with the handle.

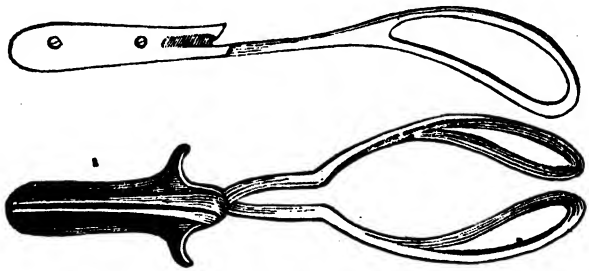
FIG. 478.
Japanese Traction Apparatus.
(Witkowski).

They are made of steel, the blades being rounded off and polished, the handles square, black and dull, terminating

in two divergent flattened hooks." For measurements see appendix. (See fig. 477 also fig. 478 representing a Japanese traction apparatus).

1860(?) Meadows.

Alfred Meadows was born at Ipswich in 1832. He obtained the degree of M.B. in 1857 and of M.D. in 1858 of the University of London. He became Physician-Accoucheur to, and Lecturer on Midwifery at St. Mary's Hospital, Physician-Accoucheur to the General Lying-in Hospital, York road and Physician to the Hospital for Women, Soho Square, London.



FIGS. 479, 480.
Meadow's Forceps.
Upper figure—Side View of Right Branch.
Lower figure—(Meadows) Complete Forceps.

He was the Editor of the Catalogue and Report of Obstetrical and other instruments exhibited at the conversazione of the Obstetrical Society in 1866. He was the first President of the British Gynæcological Society. He died on April 19th, 1887. He exhibited his forceps at the conversazione of the Obstetrical Society of London. The form of lock was ordinary while the handle was of wood, straight, smooth with finger-rests. For measurements see appendix. (See figs. 479, 480).

1860(?) Murphy.

Edward William Murphy, Professor of Midwifery, University College London; Obstetric Physician, University College Hospital and formerly Assistant Physician to the Dublin Lying-in Hospital, constructed a forceps, the blades of

which were straight, with small shanks, ordinary lock and straight handles of wood. (See fig. 481).

He modified Beatty's forceps, by adding a shank, thus lengthening the instrument by about an inch. It is thus denominated a "medium" forceps. Doran thus describes a sample of this forceps in the museum of the Royal College of Surgeons, London:—

"Handles lined with smooth ebony, big palm-rest, no finger-rest or flange, nor shoulder. English lock.

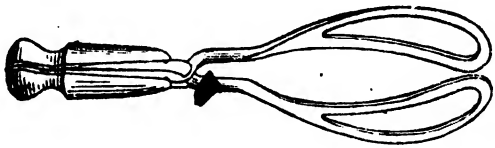


FIG. 481.
Murphy's Forceps.
(Witkowski).

The shanks of the blades run upwards, almost parallel, with a space between them as in Evans', Aitken's and Simpson's forceps. Murphy figures this forceps in his "Lectures on the Principles and Practice of Midwifery 1862, p. 364, fig. 106. He also describes and figures Beatty's forceps (fig. 105) Murphy adds, in a footnote: "In this instrument we have added a shank to the blades about one inch in length, when it is necessary to introduce them high within the pelvic cavity." For measurements see appendix.

1860(?) Pagan.

John M. Pagan was born in 1802 at Halglenmuir, an upland Ayrshire district of Scotland. He graduated at Edinburgh in 1823, and commenced practice at Preston, in Lancashire in 1825. He settled in Glasgow in 1827 and was appointed Regius Professor of Midwifery and the Diseases of Women and Children to the University in 1840. He died on May 19th, 1868.

The forceps which goes by his name, have very long blades, with no pelvic curve. They were specially designed

for grasping the child's head when unduly elongated. (See fig. 482).

1860(?) Schroeder.

Karl Schroeder was Professor of Midwifery and Director of the Lying-in Institution in the University of Erlangen. He was an Honorary Fellow of the British Gynaecological Society. He died in 1887. Professor Virchow, who made a post-mortem examination, found that the cause of death was an old cerebral abscess which had become encysted and had broken into the right lateral ventricle causing acute purulent inflammation of the brain. The cause of the formation of the abscess remained

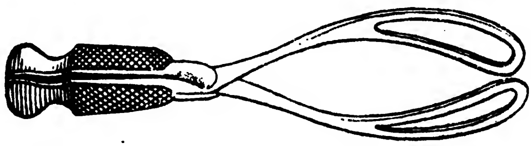


FIG. 482.
Pagan's Forceps.
(Witkowski).

obscure but from its contents Virchow concluded that it must have existed for several years past. His instrument was of the typical German (Naegele) type. (See fig. 483).

1860(?) Young.

In the Museum of the Royal College of Surgeons, there is a pair of forceps labelled "Young" (No. 49). Doran in his descriptive catalogue says that "the name of Young was ascribed to this forceps when it was placed in a case in the Museum of the Obstetrical Society." He describes the forceps thus.—"A forceps of the Levret type, each limb of one piece of solid nickel-plated(?) steel flattened and slightly convex externally, ending in blunt hooks, the left unscrewing, the right bearing a slot for tapes. Lock of the old French type a flat thumb-piece on the left blade, fitting into a slot in the right blade.

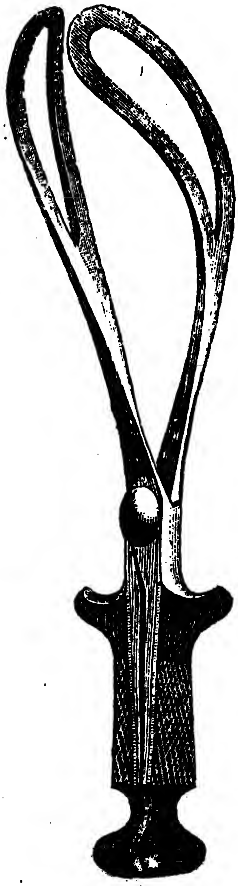


FIG. 483.
Schrœder's Forceps.
(Jetter & Scheerer).

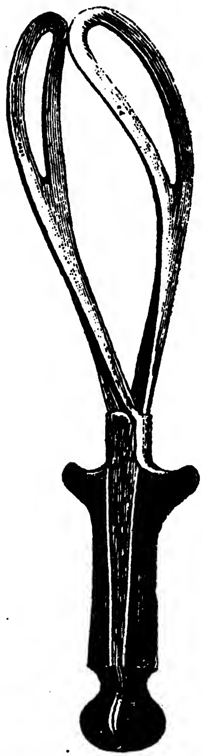


FIG. 484.
Spiegelberg's Forceps.
(Jetter & Scheerer).

Blades with pelvic curve, no distinct shanks, inner surface flat." For measurements see appendix.

It is evident that there is no authenticity regarding the inventor's name. The forceps is of the French type, and in ascribing "Young" as its inventor there has certainly been some mistake. The only obstetrician of repute of that name was Thomas Young who was Professor of Midwifery at Edinburgh (1756-1780). He has left no printed work and the manuscript copies of his lectures in the library of the Royal Society of Medicine, contain no reference to his forceps. It may thus be assumed that the forceps above referred to, was not constructed by Thomas Young. It should be noted however that amongst the exhibitors of samples of forceps at the conversazione of the Obstetrical Society of London, occurs the name of "Young" who was evidently an instrument maker of Edinburgh. This exhibitor "Young" exhibited Duncan's and Simpson's forceps and possibly he also exhibited a pair of French forceps in his possession at the conversazione, which was deposited in the museum of the Obstetrical Society, wrongly labelled.

Kilian in his Armamentarium illustrates Young's forceps. (See fig. 248). Sir Alexander Russel Simpson, also in his paper on "the invention and evolution of midwifery forceps" alludes to this forceps, which has the perineal curve used by his predecessor, Professor Young. Thus it is conclusively proved that the forceps alluded to above by Doran is not the forceps used by Professor Young of Edinburgh.

1860(?) Spiegelberg.

Otto Spiegelberg was born January 9, 1830, at Peine in Hanover, and after receiving his classical education at Hildesheim, entered the University of Gottingen at the age of 18. There he began to study Midwifery under E. C. J. Von Siebold, and soon developed a strong liking for this department of Medicine. In 1852 he visited Vienna, and afterwards England, Scotland, and Ireland, in order to study the methods of procedure in the Lying-in Institutions of these countries.

Shortly after his return to Gottingen he published (1858) an excellent Compendium of Midwifery, and in 1860 was appointed Professor Extraordinarius of Midwifery in the University. The following year he was called to Freiburg as Prof. Ordinarius, and two years afterwards (1864) removed to Konigsberg, which however he again quitted on being appointed (1865) Professor of Obstetric Medicine in the University of Breslau.

In 1870 in conjunction with Crede, Spiegelberg started the Archiv fur Gynakologie, and throughout his life was a constant and valuable contributor. Meanwhile he was accumulating a large practice, which however did not prevent him from devoting much time to the great work with which his name is mainly associated, *viz.*, the Lehrbuch der Geburtshulfe. The Lehrbuch appeared in 1878, and became so popular that in 1880 a second edition was called for, and Spiegelberg was far advanced with its preparation at the time of his death.

Symptoms of failing health appeared in the summer of 1880, but so great was Spiegelberg's enthusiasm for his work, that it was with difficulty that he could be persuaded to abandon it for a season.

A change to the Riviera and elsewhere restored him temporarily, but before long the symptoms returned in an aggravated form, and on the 9th of August, 1881 he passed away. The cause of death proved to be hypertrophy of the heart and contracted kidneys.

The unfinished portions of the second edition were edited by Dr. Wiener, late assistant to Spiegelberg.

In his Lehrbuch der Geburtshulfe, he stated the following qualities of a good forceps.

"A good forceps must (1) be made of steel, which will not bend, although it may spring a little. It must everywhere be smoothly polished, so as not to injure the head, and to prevent septic matters collecting in any depressions.

(2) It must have an appropriate length, 40 cm. (15.75 in.) being the highest limit. A greater length is unnecessary, if the instrument, as I advise (cf. 926, section 5), is only applied

to the head, when lying below the brim, while on the other hand it renders the forceps unmanageable. Too short an instrument again will not always do its work, and moreover the lock will lie within the generative organs. The handles should on an average be 5 cm. (2 in.) shorter than the blades; where they measure the same, the handles will form the longer arm of the lever, and will be apt to compress the head too severely.

(3) The blades must possess a cephalic and a pelvic curve. The former must not be less than 7 cm. (2.75 in.) in width; indeed a somewhat greater measurement would, if anything, be safer, as rendering the skull less liable to severe compression, when the handles are pressed close together. Further, the widest portion must not be more than 7-8 cm. (3 in.) from the point of the instrument; where the distance is greater, undue compression of the head might occur, since during traction the head advances towards the point of the instrument, and the blades must then be firmly pressed together, to prevent the instrument from gliding off. Again, the more fully the head lies within the curve, the more room it will have for undergoing its normal rotations within the forceps. The points must on no account be in contact, when the handles are wholly closed. There must be a free space of at least 1½ cm. (.6 in.), since otherwise the soft coverings of the head, which advance between the ends of the blades, when the handles are closed, might be crushed during such closure. The pelvic curve (which was made known by Levret as "la nouvelle courbure," although it is said to have been invented by a surgeon in Chelmsford, Benjamin Pugh, 7 years earlier) begins at the lock, and gradually increases towards the point, so that when the instrument lies on a flat surface, its highest point rises 9 cm. (3.5 in.) above the latter. Instruments with a smaller pelvic curvature are only suited for extractions, where the head lies below the middle of the pelvis; indeed straight forceps may be used for operations in, or not much above, the outlet. The perineal curve, which has been introduced into some forceps (Mulder, Froriep, Hermann), is superfluous.

(4) The greatest width of the blades, not far (3½ cm.—1.4 in.) from the point, amounts to somewhat over 4 cm. (1.6 in.), and from there they gradually narrow towards the lock. The blades are usually fenestrated, in order to lessen the weight of the instrument, and to facilitate its close adaptation to the head. The rims of the fenestrae measure 1 cm. (.4 in.) in width; their thickness is greatest in the middle (4 mm.—.15 in.), and diminishes towards the margins. The latter must be rounded off.

(5) The handle must be so shaped, as to be conveniently gripped by the operating hand. The metal core is covered with a thick, perfectly smooth, layer of wood. The lower end is knob-shaped, while just above it a depression offers a convenient hold to the hand. About 1 cm. (.5 in.) below the lock, hooklike projections, with a concavity upwards, are added; they facilitate the closure of the instrument, and enable traction to be made upon them. Hooks etc. at the lower end are less desirable, since they may offer facilities for strong side to side swaying movements.

(6) The lock must be convenient, and at the same time reliable. In the German form (suggested by Naegele and Busch), which possesses these requisites, one arm bites into the other, while a pin, which is situated on the left arm, and which again fits into a notch in the right one, effects the necessary fixation."

He evidently constructed his forceps in conformity to the points mentioned above. (See fig. 484). In his book on Midwifery he says:—"I myself use the modification made by Trefurt (cf. his Abhandlungen, Gottingen, 1844, p. 141), which is in principle a combination of the instruments of Busch, Naegele and D'Outrepont."

1860. Hubert.

Professor L. J. Hubert of Louvain published a very important work,* embodying the results of his researches on

*Note sur l' equilibre de forcep et du levier, Mem. de l'Acad. roy de Belgique, 1860.

the bad effects of traction on the handles of the forceps in a wrong direction. He studied scientifically, with many geometrical demonstrations and mechanical expositions. He showed that a force, striking against each point of the pelvis, decomposed itself into two parts: the one which acting per-

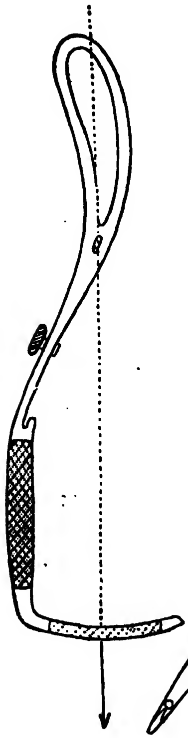


FIG. 485.
Hubert's Forceps.
Second Model.
(Poullet).

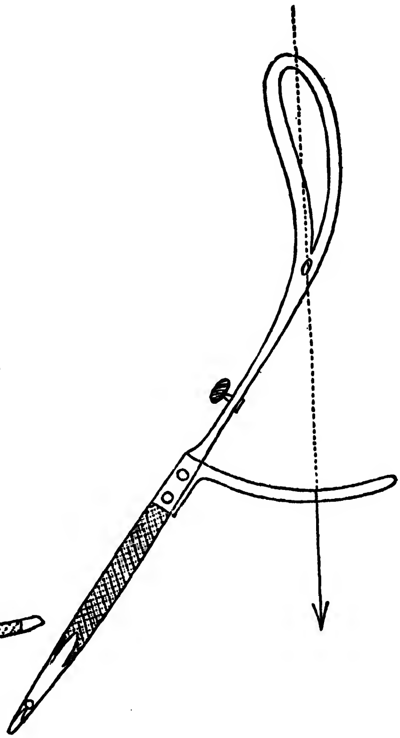


FIG. 486.
Hubert's Forceps.
First Model.
(Poullet).

pendicularly, compresses the soft parts of the mother, and the other, which only is utilised for the possible displacement of the body to be extracted. The first part of the force is transformed into vicious compression, which becomes worse

as one gets further away from the axis of the canal through which it is transmitted. He showed on the other hand, that the pelvic curve of the forceps, does not allow traction on the handles to pull the head in the desired direction, which is strictly a straight line forming the axis of the extremities of the blades. One must therefore, by some artificial means apply the force on some point of that line. Hubert did not think of employing the force of traction on a point of the blades but he added to the handle of the forceps a fixed metallic arc (see fig. 486) and employed traction on the point of this arc which is cut by the line of axis of the blades.

He also had a special forceps constructed, the handles of which are curved over in the desired direction. (See fig. 485).

To Hubert belongs the credit of enunciating the following principle in obstetrics:—

"The direction of traction must coincide with the line which constitutes the axis of the blades of the forceps."

1861. Hewitt.

William Morse Graily Hewitt was born at Bradbury, Wilts in 1828. In October, 1846, he entered as a medical student at University College, London. His career as a student was a most brilliant one. He became qualified to practise in 1850. In 1855, he was appointed Surgical Registrar to St. Mary's Hospital. In 1858 he was appointed Physician to Samaritan Hospital, and in 1859 to the British Lying-in Hospital. In 1860 he undertook the duties of Joint Lecturer on Midwifery at St. Mary's Hospital Medical School along with Dr. Tyler Smith and in 1864 he became Assistant Physician-Accoucheur to the Hospital. He was the first secretary of the Obstetrical Society of London. He was known all over the world as the originator and upholder of certain views as to the pathological importance of alterations in the shape and position of the uterus. His writings caused a great deal more attention to be given to uterine displacements by gynaecologists all over the civilised world than had been the case before. He died from uraemia on August 27th, 1893.

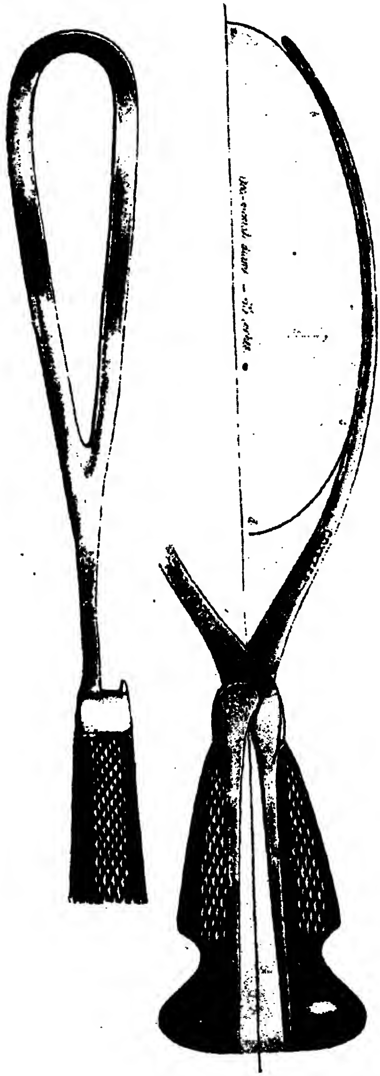


FIG. 487.—Shows the width and shape of the fenestrum.

FIG. 488.—Shows the perfect adaptation of the blade by its shape and length of the curve, to the long curve *a, b, c, d*, of the elongated head. The blade is 8 inches long, the curve that of a circle 14 inches in diameter.

FIG. 487. FIG. 488.

Hewitt's Forceps.
(Obstetrical Transactions iii).

FIG. 489.—Shows the 7-inch forceps *e f g* as applied to the side of an *elongated* head *a b c d* with an occipito-mental diameter of 6½ inches. It may be seen that the curve of the instrument is not adapted to that of the head. The dotted line is intended to represent the blade in the act of being introduced and at the moment when difficulty is encountered. If the instrument is to be pushed beyond the point *b*, undesirable separation of the canal from the head, must be effected.

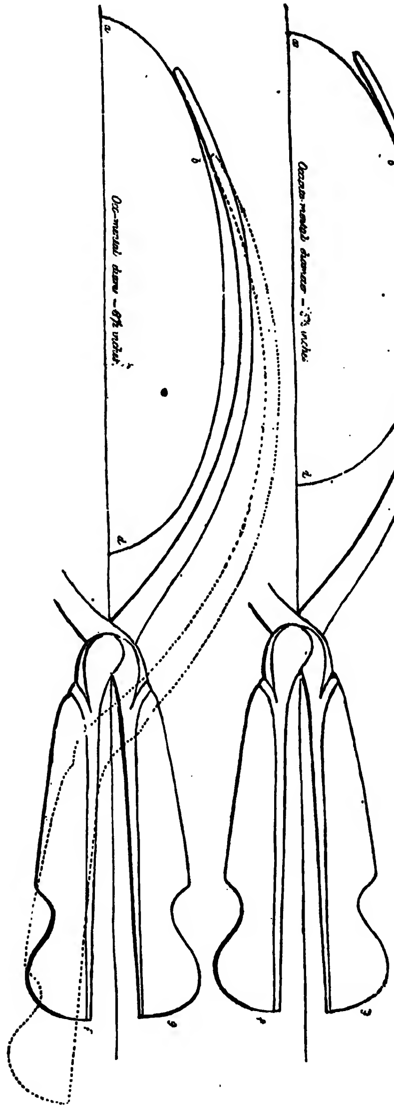


FIG. 490.—Shows the ordinary forceps *e f g* applied to a curved line, *a b c d*, which represents the side of an average-sized head, unchanged as regards its form. The blade of the forceps is 7 inches long, the occipito-mental diameter of the head is 5½ inches. The adaptation of the instrument to the curve of the head is evident.

FIG. 489. FIG. 490.

Ordinary Forceps.
(Obstetrical Transactions iii).

Hewitt* exhibited before the Obstetrical Society of London on 5 June, 1861, a modified forceps adapted for use in those difficult cases caused by unusual elongation of the foetal head. "It only differs from the common straight forceps in use in this country in having longer blades and in the blades themselves having a different curve. The length of the blades is 8 inches instead of 6½ or 7 and the curve is an arc of a circle of 14 inches in diameter instead of 10 or 11. The instrument when locked is fitted to inclose a larger oval than the ordinary forceps. (See figs. 487—90). "The instrument in question resembles, in fact, but only so far as the curvature of the blade is concerned the one used in France at this day and which is a modification of Levret instrument. The curve of the French instrument is that of a circle of 15 or 16 inches in diameter. And the instrument resembles in the length of the blade and the shape of the curve, the one devised by Smellie for cases in which the head is high up and which has been subsequently improved into the modern "long forceps" (British). Smellie's instrument had what is called the pelvic curve but in other respects it very much resembles the one now submitted to the notice of the Society."

Doran gives the following descriptions of two samples in the Museum of the Royal College of Surgeons, in his descriptive catalogue.—

Forceps I.—"Handles lined with smooth ebony big palm-rest, no finger-rest or flange, no shoulder, English lock.

The blades are long and narrow with no shank and with an unusually wide curve, to be adapted to a highly-elongated foetal head. The inner surface is quite smooth and flat. This forceps corresponds precisely, save that its handles are smooth, with the full-size drawings accompanying Graily Hewitt's original description."

Forceps II.—"Handles lined with roughened ebony, big palm-rest, no finger-rests or flange and no shoulder, English lock.

*Obstetrical Transaction Vol. III. P. 190.

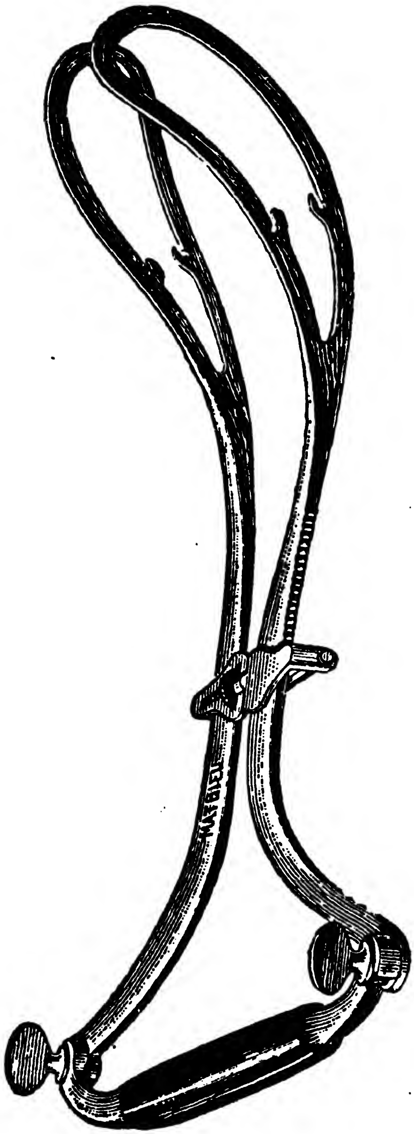


FIG. 491.
Chassagny's Forceps.
(Witkowski).

This instrument was labelled "Forceps, Graily Hewitt" in the museum of the Obstetrical Society. It does not correspond precisely with the drawing accompanying Graily Hewitt's original description, being shorter, with broader blades, thicker and wider around fenestrae, whilst the curve is narrower."

For measurements see appendix.

1861. Chassagny.

Chassagny of Lyon, described before the Academy of Medicine on 26th February, 1861, a forceps devised for "continued traction and progressive pressure." The inventor desired to obtain two results (1) a slow and regular pressure on the foetal head, the pressure being applied on the entire vault of the cranium but relieving the base and (2) a method of regular and continuous traction, to replace that by the hand. To achieve these results, he made the branches of unusual length and of great flexibility and a small handle which is worked continuously with a screw, which in turn communicates its rotatory movements to a hand-winch, placed in the middle of an arch supported on the knees of the patient. A string of catgut holds the forceps as near the head as possible and connects on to the hand-winch. One can then exercise a pull, without jerking, without violence and with a slowness, of which one can have an idea, when it is said, that each turn of the handle draws in a millimetre of the string. Thanks to the flexibility, to the elasticity of the branches,—elasticity, such that one can make a large part of the curvature to change into flatness—the vault of the cranium may be flattened, drawn towards the posterior side of the blades, elongated as Nature would do while this reduction of the head can be carried out, without it being possible, whatever may be the force employed, to transmit to the base of the cranium a pressure greater than what results from the elasticity of the branches. The mechanism of Chassagny's forceps resembles that of a nut-chacker.

Towards the middle of the 19th century, Chassagny* undertook the study of the subject of parallel branched forceps,

*Forceps Lyonnais by Rolland.

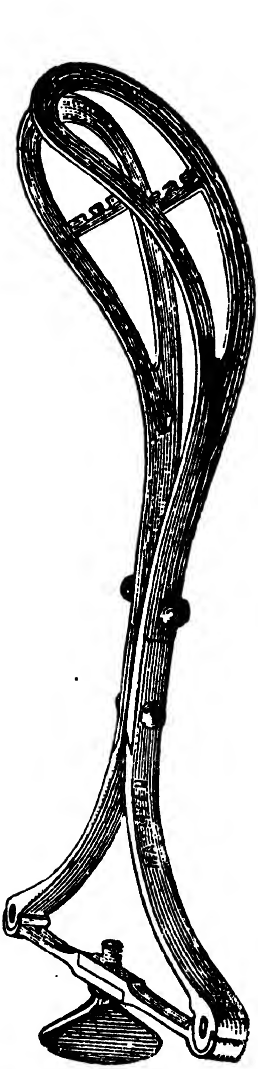


FIG. 492.
Chassagny's Forceps.
(Another Model).
(Witkowski).

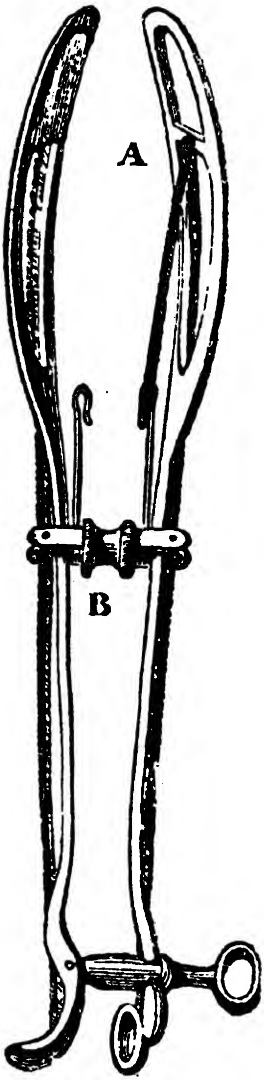


FIG. 493.
Chassagny's Forceps.
(Adapted for Mechanical Traction)
(Witkowski).

which proved to be the most productive conception of Thenance's labour. In fact, the forceps has been transformed by Chassagny. He demonstrated by his mathematical and experimental researches, that traction by ordinary forceps is defective. He then tried to apply continuous traction with the instrument and discovered the point of applying force to the centre of the figure.

According to Chassagny, both Levret and Thenance, assumed the head to be of an elliptical form. Chassagny has broken with tradition and nothing in his forceps recalls to mind this classical ellipse. The branches are straight in their whole length except at the extremity where they are slightly curved in. In the uncrossed forceps, the branches which are very close to one another, widen out more or less abruptly at the point where they form the obligatory ellipse.

In Chassagny's forceps the branches are articulated by means of a transverse piece, intended to widen them. The branches are thus held at a distance in their whole length so as to form a large space which is an artificial reproduction of the lengthening of the head.

The branches measure 40 cm. from the articulation to the extremity of the blades, measured along the outer lines of the curves. As in a straight line they measure only 37 cm. while flat, they are 30 cm. long.

The cephalic curve is very slight and is produced by the arc of a circle with a radius of 10 cm. so that each of the extremity of the blades is brought together by 3 cm. of the middle line. When the branches are articulated, they are parallel to each other in the greater part of their length and maintain an equal distance of 6 cm.

The right branch terminates by a rounded, olive-pointed hook. The left branch ends in a flattened blunt hook which is curved at almost a right angle, as in most of the old forceps.

For 21 cm., the branches have a uniform width of 13 cm. They then widen out to form the blades which measure 5 cm. out of which 10 mm. are for the rims and 34 mm. of empty space to form the fenestrum which measures 13 cm. long. There are two small hooks on the rims of the fenestrum to

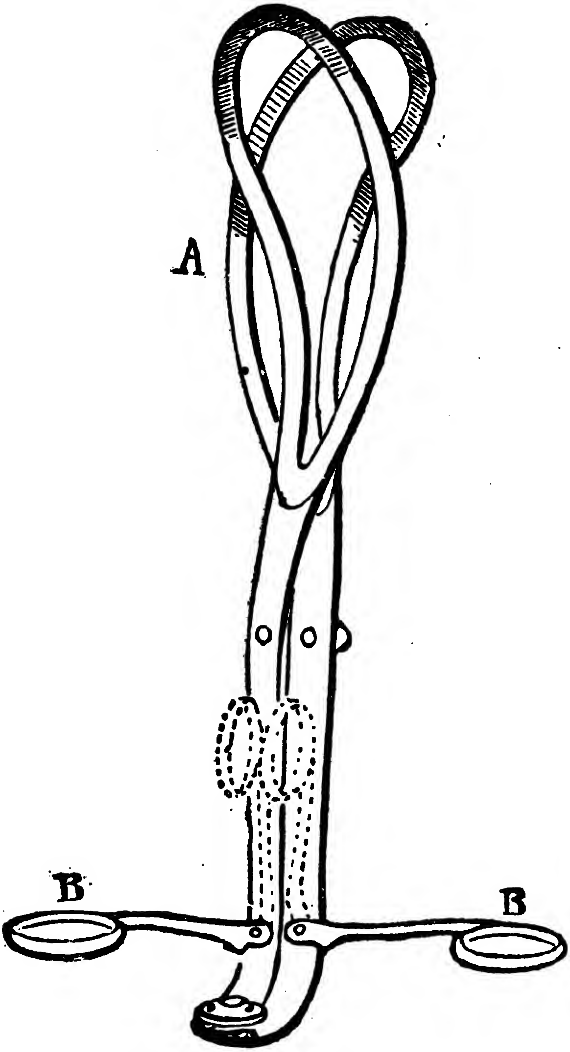


FIG. 494.
Chassagny's Rotating Forceps.
(Folded for the pouch).
(Witkowski).

recieve the loop of the traction string. At the articulation, the left branch is slightly widened.

The thickness of the branches is 5 mm. for 19 cm. *i.e.*, to the point where the blades begin. The thickness gradually increases to 7.5 mm. and then diminishing to 2 mm. The right branch is slightly thickened to receive the articulation; the left branch is also thickened for the reason already explained.

As the branches lie in the pelvis, they are absolutely straight for a certain length, then they curve up until their extremities are 10 cm. above the horizontal plane forming the "pelvic" curve. The arc of the circle representing this curvature is produced by a radius of 17 cm.

The articulation is made by means of tenon which enter a mortise hollowed out in the right branch. A screw pierces both the branch of the forceps and the tenon forming a hinge which allows the piece to move. At a distance of 6 cm. from this point, there is a shoulder-piece, which is destined to rest against the borders of the hole of the left branch. Beyond this shoulder, there is a nipple-like projection, the base of which fits the hole. There is a screw on this projection and a screw-nut with a shoulder-piece, terminated by a nipple of the same kind, runs on the screw.

When the screw-nut is taken off, the portion of the screw, between the two nipples can penetrate the notch on the border of the left branch of the forceps. When the screw has penetrated in the hole, the two nipples can be brought near each other by tightening the nut. By adjusting the nut, the left branch is tightened between the double shoulder pieces and the two branches may be brought together in parallelism.

The branches, instead of being rigid, are flexible. This flexibility seems to be an improvement. When the branches bend under the pressure exercised between the head and the articulation, this pressure is no longer transmitted to the extremity of the blades and instead of approaching the base of the skull, they widen out in a perceptible manner.

The branches do not represent a lever of the first kind the fulcrum being at the articulation, the power at the extremity

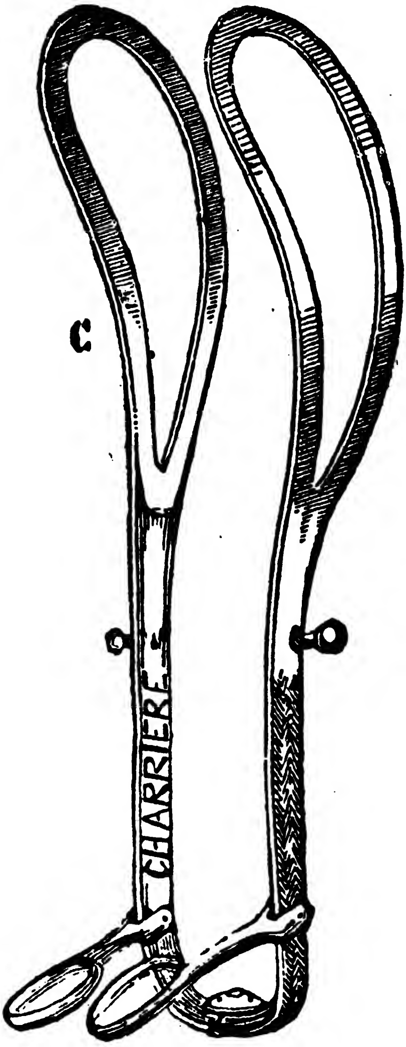


FIG. 495.
Chassagny's Rotating Forceps.
Open during use.
(Witkowski).

of the branches (near handle) and the resistance, at the extremity of the blades. They are not like straight forceps, a third kind of lever, the fulcrum of which is at the articulation, the resistance at the extremity of the blades and the power between the two points. They are a lever of the second kind, the power of which lies at the point where pressure is brought to bear, the fulcrum and resistance of which are amalgamated and exerted on the compressible parts of the vault. This pressure not only compresses the diameter of the head which is seized but enables the head to be lengthened so as to be received in the space between the blades.

In order to take advantage of this flexibility of the branches and to maintain them in position during extraction, a sliding ring is employed. This ring is divided into two halves before applying, each of which exercises its action on the branch on which it is placed. They are united by introducing one into the other. The screw acts as a joint with half of the sliding ring; if it is brought back to the axis of the instrument, it is made to penetrate in the slit. By tightening the nut, the two halves are brought together thus forming a complete ring, capable of being made larger or smaller, so long as the nut has not been tightened. Thus the two halves cannot stretch out any more and the branches are completely immobile. The flexibility of the branches of the forceps necessitates a modification of the arrangements for bringing the blades together. These must act as near to the head as possible so as to prevent slipping of the forceps in the longitudinal axis. This advantage is obtained by the help of the smooth ring. The halves of this ring are brought together easily and a separation of 6.5 cm. to 4 cm. may be obtained so as to adapt itself to different sizes of the head. To accomplish this it is sufficient to loosen the screw. This sliding ring system has been employed by Burton and Valette in their forceps. This ring glides on two inclined planes on two straight lines; it can be steadily pushed till a point where the positions of the blades are too narrow to enable them to stretch more. The pressure can thus be regulated by sliding

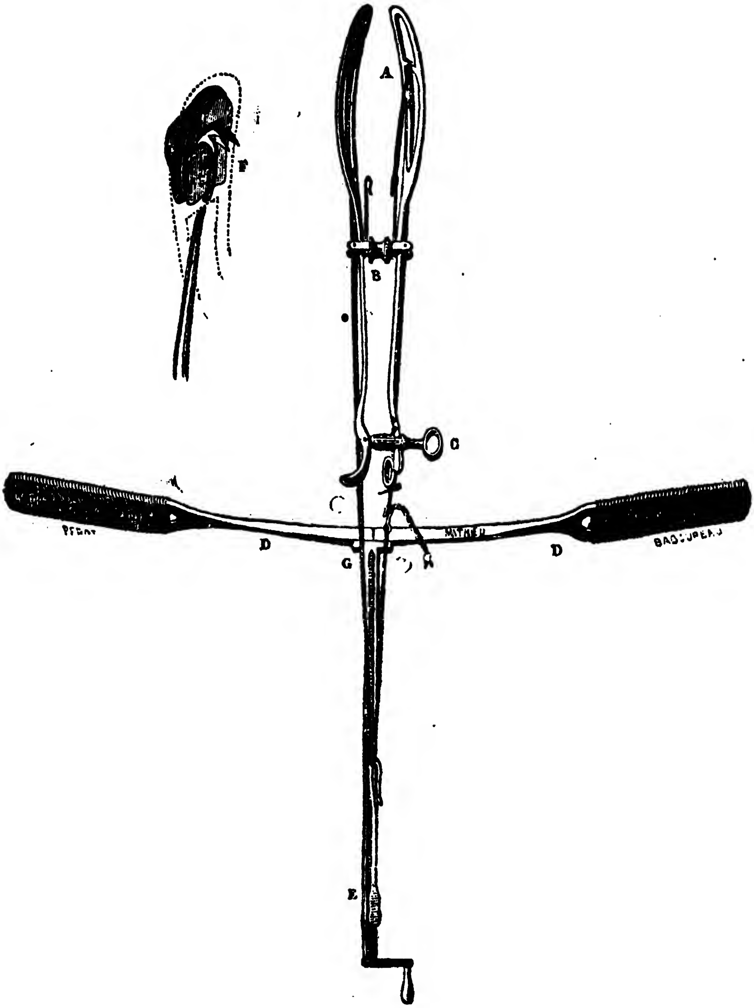


FIG. 496.
Chassagny's mechanical tractor.
(Witkowski).

the ring and once it has been regulated, it can be made immobile by tightening the screw.

Chassagny's forceps are so constructed that the power may be applied to the "centre of the figure." (See figs. 491—5).

The instrument weighs 810 grammes.

In 1860 Chassagny was the first to publish the earliest trials of mechanical traction in human obstetrics, the first mechanical tractor being employed in veterinary practice by Baron in 1858.

About 1875 Chassagny showed to the Academy of Medical Sciences an apparatus with perineal rest, which was at that time made of wood and which he has improved, by having a large perineal plate made of metal, on which he articulates a long lever which is made movable to furnish during the whole time that labour lasts, a resting point, giving a satisfactory direction to the mechanical traction. (See fig. 496).

1862. Cappie.

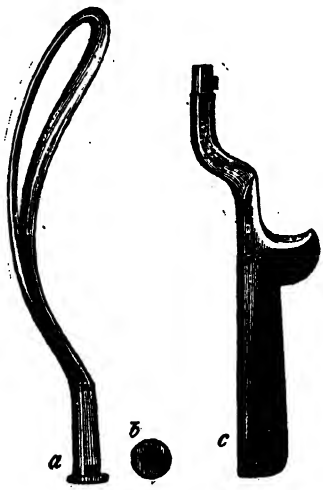
Dr. James Cappie read a paper before the Edinburgh Obstetrical Society on May 10, 1871 on "the mode of introducing the midwifery forceps" with the following note on his modified forceps:—

"A few years ago* I showed an instrument at this Society, intended to be such a modification of the long forceps, that the shank being cut at the middle, a joint was contrived by which the pieces could with facility be joined or detached. The Simpson forceps could thus be made as portable as the common short forceps. In contriving the joint, there was a rather intricate mechanism of spring and catch to prevent the pieces becoming too readily disjoined. After some experience, however, I have discarded this mechanism as quite unnecessary and for several years have found the simple instrument which I now show to the Society, to answer admirably.

The two portions are joined by what is known as the bayonet joint. On the blade portion *a* there is a socket in the rim of which is a notch, *b* which leads to a horizontal

*Edin. Med. Journ., Dec. 1862.

slit, extending about one-third round the circumference of the socket. On the handle portion, *c*, is a nipple which fits in the socket and on it there is a small knob which enters at the notch. When the nipple is fairly inserted and a quarter turn is given to the handle, the knob slides along the horizontal slit, and the blade and handle portions have then exactly the same relations to one another that they have in the solid instrument. (See figs. 497—9).



FIGS. 497-9.
Cappie's Forceps.
(Obs. Transac. Edin. ii).

In making the socket it is very necessary to attend to the direction of the slit. In both blades, the notch for receiving the knob of the nipple is opposite the concave *edge* of the blade and the slit itself terminates opposite the concave *side.* It will then be found that with either blade, the rotatory movement necessary to join the pieces is in the same direction as the rotatory movement that must be given when the blade is to be adjusted to its position on the head.

On looking at the instrument .... the first impression may be that the joints are insecure, as the tips of the blades

appear to fall readily inwards. But it is to be remembered that in practical use, the child's head is between the blades and when they are locked, the whole instrument is as immobile as the solid-stemmed long forceps."

1862(?) Neugebauer.

Louis Adolphe Neugebauer was born at Kalazis, in Poland on the 6th May, 1821. He studied at Dorpat and at Breslau, where he took the degree of Doctor of Medicine and Doctor of Obstetrics in 1846. He then took a scientific voyage through France, Berlin, Vienna, Prague and Northern Italy. In 1850 he returned to Poland where he commenced his laborious and conscientious work which resulted in the addition to medical literature of no less a number than 127 published works.

In 1859, he began his lectures on "Midwifery and Diseases of Women" which he continued in his clinique until the time of his death. He lectured at the Medico-Chirurgical Academy at Warsaw, then at the principal school and lastly at the University which was founded in 1869, after having learnt the Russian language at 48 years of age. He was the recepient of honorary distinctions from 34 different Medical Societies of Europe and America. He was in personal relation with the whole scientific world. He knew nearly all the great towns of Europe, their hospitals, their medical celebrities and their peculiarities. He enriched the gynœcological armamentarium by the addition of various instruments. He made an important modification of the midwifery forceps but no description nor diagram is available. He died suddenly of apoplexy at Berlin on the 9th August, 1890.

1863. Rizzoli.

F. Rizzoli was born in Milan in 1809, his father having been assassinated by brigands shortly before his birth. Adopted by an uncle he was educated at Bologna. After having completed his medical education at the University of Bologna, he was appointed Assistant Surgeon to the hospital

of the Abbandonati in that city, and in the year 1836 was made Assistant Professor of Surgery and Obstetrics and in 1842 succeeded to the Chair when Prof. Baroni removed to Rome. This appointment he held until 1865, when he became Emeritus Professor and Consulting Surgeon to the hospital. He was elected an Honorary Fellow of the Obstetrical Society of London in 1866. He published a very large number of papers on various subjects connected with surgery and obstetrics. He was a man of indomitable energy and profound scientific acquirements. He died early in the year 1881 in Bologna. He bequeathed the whole of his fortune for the purpose of establishing a new hospital in Bologna.

Rizzoli provided his forceps with double pivot and double groove, so that either branch of the forceps could be introduced first and locked with the second blade without uncrossing. Moreover the forceps was so constructed that the branches could be introduced when the os uteri was only partially dilated, complete dilatation being effected by traction on the handles. Rizzoli thus used his forceps as dilator of the cervix—a practice which is generally condemned.

Three pairs of different sizes of Long Double-curved forceps were exhibited at the London Obstetrical Society's conversazione in 1866. "First pair—Blades very narrow and tapering at their extremities, fenestræ long and narrow; handles flat, straight, lying upon and parallel to each other; terminating in a blunt hook and hook at right angles. Second pair—With three blades broader, fenestræ wider; handles crossed like a pair of scissors and broad, terminating in a blunt hook and hook at right angles. Third and smallest pair:—Blades narrow and tapering, handles flat and superposed like the first pair; forceps key with a terminal and central slit for turning the buttons of the locks." For measurements see appendix.

The following description of Rizzoli's forceps appears in New Sydenham Society's Lexicon:—

The male branch presents a double hinge like that of Tarsitani. The female branch has a longitudinal fissure, 22 mm. long, 7 mm. wide. The fissure present at the superior

third of its borders is a conical excavation, with the base forwards. The first excavation receives the hinge when the male branch is behind, the second when it is in front.

Doran describes the three samples of Rizzoli's forceps in the museum of the Royal College of Surgeons, London, thus:—

Rizzoli's Long Forceps with Reversible Blades: After Tarsitani.

A large, heavy forceps of the Levret type with important modification, being constructed so that either blade could be introduced first. The handles are extremely flattened antero-posteriorly, with levelled edges; at their extremities one is everted at a right angle and the other turned up so as to form a blunt hook. The handles are super-imposed, not opposed, resting in apposition. At the lock, the right or female limb is slotted to allow of a lateral deviation of the blade. The slot receives a thumblock attached to the male limb, made so as to revolve and fix the blades securely. In order that the blades may be used indifferently this lock bears a thumb piece on both sides. The spanner here exhibited (No. 45) was used to unfix the thumb-piece when necessary. The thickness of the limb is diminished by a half in the region of the joint. The thumb-pieces can readily be introduced from before backwards or *vice versa*. There is a flange on both sides of the bases of the everted extremities of the handles, so contrived that the handle may close properly whichever blade be uppermost.

"Rizzoli's three pairs of different sizes of long double-curved forceps" were exhibited at the Obs. Soc.'s Conversazione but are very imperfectly described in the Cat. Thureaux of New Orleans invented in 1843, *branches hermaphrodites* and *une articulation permettant d'articuler dessus ou dessous* (see Witkowski. "Arsenal Obstetrical" figs. 504, 505). In the same year Tarsitani of Naples introduced forceps *a double pivot permettant d'eviter le decroisement.* These forceps are essentially Tarsitani's."

Rizzoli's Short Forceps.

"A large heavy forceps, its blades are shorter than those of the preceding instrument. The handles are flattened but to a less degree and superimposed but not reversible. The handle of the left is rectangular at its free end, that of the right is turned up to serve as a blunt hook whilst the free ends, when closed, lie together convenient for traction. The blades are not thinner around the lock where a slot in the female or right blade receives a thumb-lock attached to the left or male blade, the thumblock revolving after it has been passed through the slot, so as to fix the lock. Compare No. 5 (Levret) where the lock is similar.

As the shanks are almost entirely superimposed when the blades are closed, the available part of the blades are shorter than in ordinary forceps. The measurement of the blades, taken as in other forceps from the tips to the lock, makes them appear unusually long. The tips of the blades are, as in the long forceps, narrow, being intended to be used if thought necessary for dilatation of the cervix."

Rizzoli's Modified Levret's Forceps (with Extra Blade).

"In this instrument the handles are not superimposed as in the two preceding forceps. One (that corresponding to the left blade) forms a blunt hook at its extremity the other being rectangular. In this sample the rectangular hook has been brazed on to the handle. The handles are convex and grooved externally. As in the long forceps the lock revolves and bears a thumb-pieces on both sides ; it passes through a slot in the female or right limb; the blades however, are not reversible and are not made thinner, but on the contrary, are rather stouter at the lock. There is an extra left blade with a blunt hook; it bears a single thumb-piece which fits into the slot. The blades are shorter than in the two preceding forceps and are broad at the tip, not being made to dilate the cervix."

Rizzoli preferred his own *articulation a pivot,* a modification of Levret's original lock with a thumb-piece on both sides,

as seen in this instrument. He, however, directed his instrument-makers, to construct similar forceps with the *articulation a coulisse* which latter form of joint, a screw pivot and lateral mortise, he admits, that he adopted his modification of Baudelocque's cephalotribe.

1863. Gayton.

William Gayton presented to the Obstetrical Society of London in 1864 a pair of Forceps with a spring-racket attached to the handles as made at his suggestion. His forceps were intended to obviate the injurious effects of continued pressure on the foetal head by means of a tape firmly secured round the handles when it is within the grasp of the forceps. The inventor states, "My addition simply consists of a means of junction on the old-rack-and-spring principle ; on the one handle, the rack and spring is placed, the other is flattened and tapered so as to be received into the furrows made for it. When the blades are applied and instrument locked, it may be kept at any degree of compression by simply raising the spring and allowing the end of the handle to advance or recede as desired. In this way during the interval of pain, the pressure is in a moment taken off the foetal head and as quickly replaced; nor do I believe does the addition in any material way interfere with the action of the instrument especially if the rack be kept downwards."

The following description is reproduced from Doran's Descriptive Catalogue.

"Handle smooth ebony, palm-rest, finger-rest or flange (not in Gayton's original drawing); at its extremity a spring-rack with lock. The lock of the forceps is of the English type, with the addition of a roller to control the rack action. Blades without shanks or pelvic curve, broadest near tips, inner surface slightly convex.

Gayton presented this sample (to the handles of which he had added finger-rests not in the original pattern) to the Obs. Soc. in 1866."

For measurements see appendix.

1864. Rouche.

Rouche made repeated attempts to modify the forceps so as to limit the pressure applied to the head of the foetus during extraction. For that purpose he placed on each branch of his forceps a pin mounted with a screw and terminated by a head 1.5 cm. in diameter. When the head of the foetus is seized, the screws are turned in such a way that their projection prevents the coming together of the branches and consequently the pressure of the blades on the foetal head. To this forceps is added a graduated stem like that of a pelvimeter and which placed in the angle of the branches allows one to measure the head of the foetus.

1864. Hamon.

All the forceps that have been described so far invariably hold the head on opposite ends of one or other of its diameters. The retro-ceps (*retro* behind and *capere* to seize) of Hamon of La Rochelle (as the derivation of the word implies), catches the head at the back, whatever be the portion of the circumference, to which it may be applied; the two blades are always placed behind the head, which they hold rather like a hand introduced flatly along the inferior floor of the vagina and penetrating in front of the posterior lip of the cervix. The retroceps is an instrument of gentleness; it need only be considered as an auxiliary of the hand; the construction of the blades, has been effected with an extreme delicacy of hand; it is necessary that they penetrate almost spontaneously, as by the simple counter-poise of the shanks. One can see from this the essential and principal difference between the forceps of Hamon and the old forceps of Chamberlen, the latter being a symmetrical diametroceps, while the latter is an asymmetrical retroceps being applied below and behind the foetal head.

The instrument is composed of two branches articulating on a common transverse handle. The blades of each branch have two curvatures—the cephalic and the pelvic. The shanks are peculiar in their lower extremities and differ from one another. The left shank, which moves from side to side, has

its end made thin with a view to penetrate in a mortise cut in the left part of the handle. A hole is made through this part of the handle and the thin end of the left shank so that a nut could be passed through to fix the shank to the handle.

The right shank, revolving on a pivot, is provided with a ring at its extremity, which is utilised as a lever for manipula-

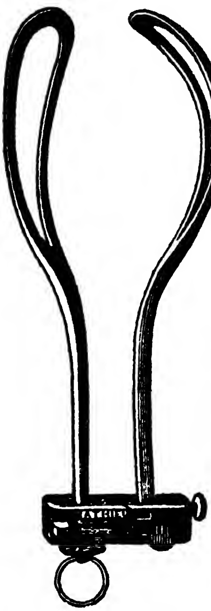


FIG. 500.
Hamon's Retroceps.
(Witkowski).

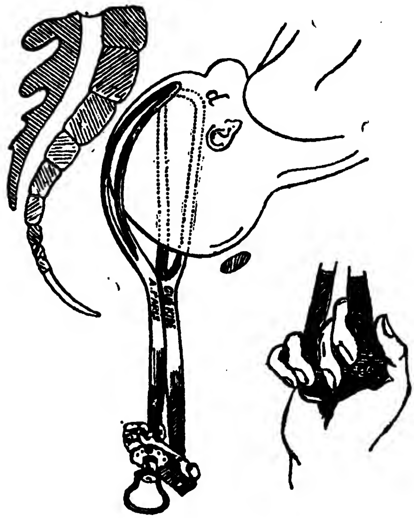


FIG. 501.
Retroceps applied to the head.
(Poullet).

FIG. 502.
Mode of grasping Retroceps.
(Poullet).

tion. Above the ring there is a round shield, pierced with four circular holes, and which is fixed to a projecting head in the handle. This is a means of fixation which permits of articulation of this branch and also of regulation of divergence of the two branches. (See figs. 500—2).

There are thus two mortises in the handle, a circular one to receive the revolving branch and, an oblong to receive the branch with lateral motion.

Hamon claims the following advantages for his instrument :—

(1) It is small, (2) Its appearance does not frighten patients and (3) It is very easy of application.

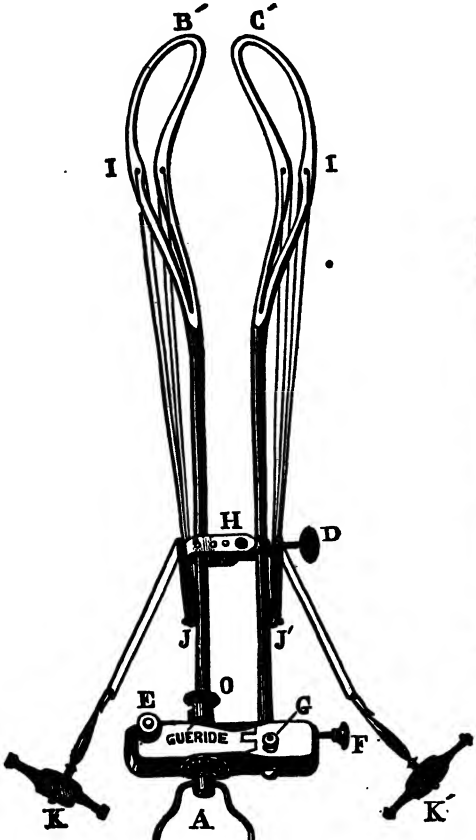


FIG. 503.
Hamon's Retroceps.
provided with traction cords.
(Witkowski).

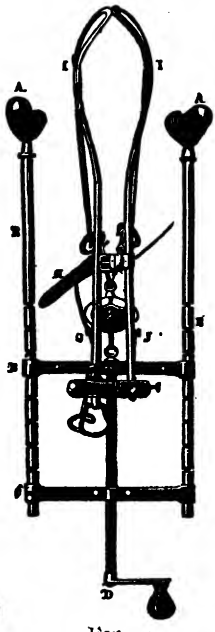


FIG. 504.
Hamon's Tractor
without dynamometer.
(Witkowski).

The instrument is quite inefficient as a forceps. It merely acts as a large lever to the posterior part of the head, and very often causes injury to the soft parts of the mother.

Hamon has also had a tractor made which rests by two crutches on each cruro-genital fold. (See figs. 503—5).

1864(?) Mondotte.

A sample of this continental forceps was exhibited at the conversazione of the Obstetrical Society of London. The inventor thus describes them: "A. Is the Pivot blade. B. The hinge blade. C, D. Two halves of the handle each carrying a blade, articulating with one another by introducing the tenon into the mortice, fastened by the screw (V) which enters the groove (V′). E. The screw which raises the blade B. and enables the operator to seize the head without compression. L. The screw which presses against the opposite handle (C) and arrests the rotation of the two handles.

The screws not being used till after the introduction and articulation of the forceps, all the difficulties of locking his instrument disappear. The inventor also draws special attention to the following points:—

The parallel handles; the locks not crossing; the blades not compressing the head; the distance between the blades can be regulated by shifting the handles." (See fig. 506).

1864(?) Faye.

Frantz Christian Faye was born in 1806. He became qualified in Medicine in 1831 but did not take the degree of Doctor of Medicine till 1842. Soon after his first qualification, he went on a mission to study an outbreak of cholera at Archangel. He devoted himself much after this to the hygiene and arrangement of hospitals, especially maternity hospitals and hospitals for children. In 1850 he removed to Christiana where he became Professor of Midwifery in the University. He retired from his position at the University in 1875. He died on May 9th, 1890, at the age of 83. He was fond of the English and in early days travelled much in England, Scotland and Ireland. He reckoned Sir James Simpson, Dr. Mathews Duncan and Dr. Robert Barnes among

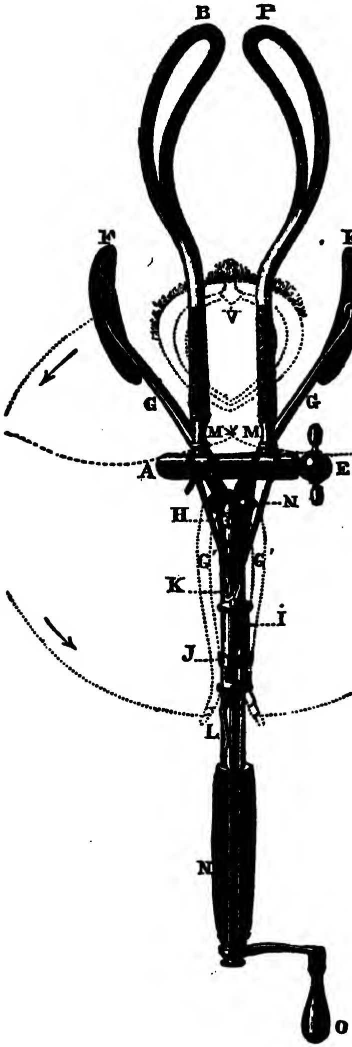


FIG. 505.
Hamon's Tractor.
New Model.
(Witkowski).

his friends. He was elected an Honorary fellow of the Obstetrical Society of London in 1863.

A sample of this forceps (continental) was exhibited at the conversazione of the Obstetrical Society of London. It had a pelvic curve, pivot lock and handles of steel, ending in blunt hooks. For measurements see appendix. No illustration is available.

1864(?) Pros.

Pros de la Rochelle constructed a forceps with parallel branches and only a slight pelvic curve. He constructed another forceps with parallel branches, the pelvic curve of which can be increased at will. Pros also adjusted a mechanical tractor for his forceps. (See 1874). (See figs. 507-8).

1864(?) Barnes.

Robert Barnes was physician to the Royal Maternity Charity and Assistant Physician Accoucheur to the London Hospital: subsequently consulting obstetric physician to the Chelsea Hospital for women. In his work "A system of Obstetric Medicine and Surgery" published in London in 1885 he describes the essentials of an effective forceps thus:—"A true long forceps is one which, whilst seizing the head at the pelvic brim, has its lock and handles clear outside the vulva. The model in most general use is probably Barnes's. This has a moderate head-curve, a moderate pelvic curve and straight handles. The forceps known as J. Y. Simpson's, still used, is really a short, or at best an intermediate forceps. The forceps should be plated with nickel to prevent rust." The following note occurs in the catalogue of instruments exhibited at the conversazione of the obstetrical society of London. "The inventor states 'the ring formed by the union of blades gives advantage of additional grasp, so that the two handles can be used together or alternately. The ring virtually lengthens the handle. The parallel shanks further give power by their length and obviate all stretch on the perineum." (See fig. 509).

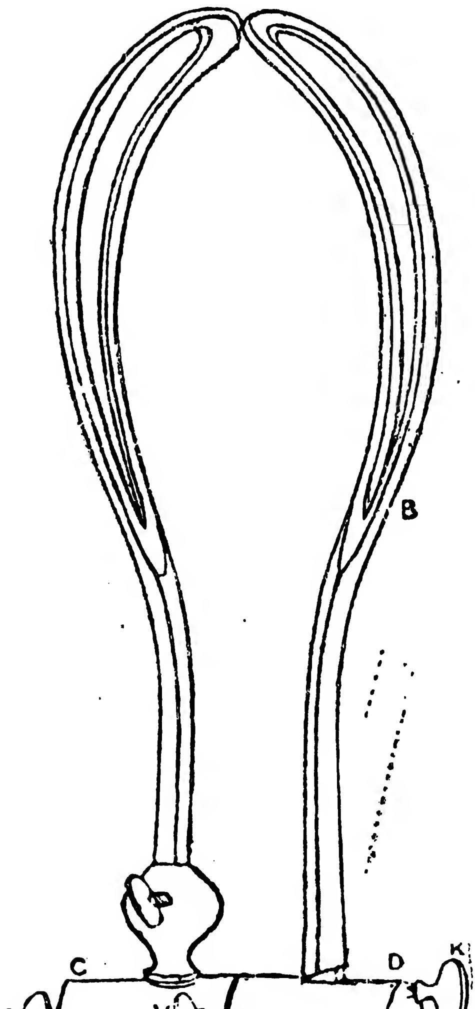


FIG. 506.
Mondotte's Forceps.
(Witkowski).

1865(?) Wallace.

William B. Wallace, (1833-1897), President of the Kings County Medical Society, was a native of Ireland. He received his early education in Scotland and Ireland. He studied medicine in Edinburgh and graduated from the Royal College of Surgeons in 1856 and from the Royal College of Physicians in 1860. During the Crimean war he was acting assistant surgeon in the Royal Navy. After the war he entered the service of the Cunard Steamship Company as Surgeon. In

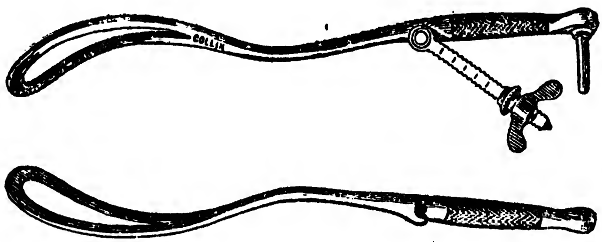


FIG. 507.
Pros' Forceps
with slight pelvic curve.
(Witkowski).

1864 he came to the United States and practised in Brooklyn. He became actively identified with educational and charitable institutions of the city and was visiting physician to several hospitals.

"There was no sacrifice within his power he was not only willing to make, but did make for the cause of Ireland and to the detriment of his professional advancement. His death was pathetic and within a few hours of that of his son, a young physician whom he had looked forward to helping him as a bread-winner."

In exhibiting several varieties of forceps before the Philadelphia Obstetrical Society in 1872, R. P. Harris stated "The Wallace forceps have come into very extensive use,

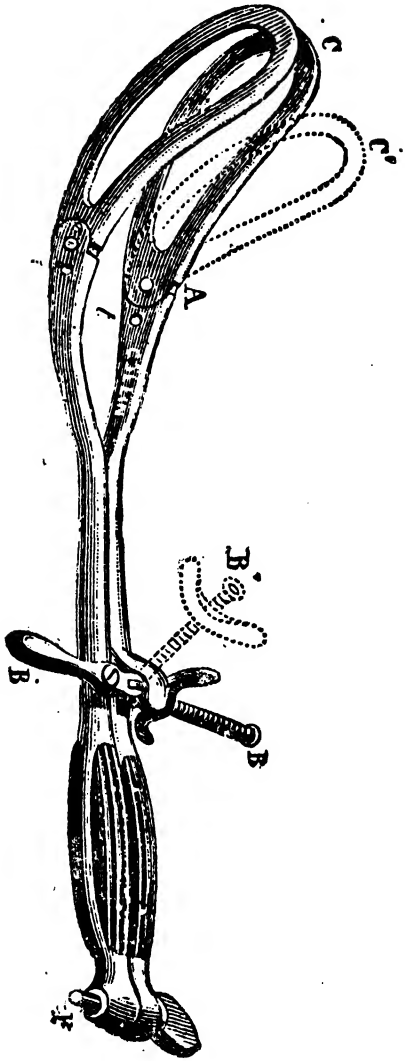


FIG. 508.
Pros' Forceps
The pelvic curve can be increased at will.
(Witkowski).

especially among the graduates of the Jefferson Medical College. This instrument is a combination of the Davis blades and Hodge handles, both somewhat modified, is very light, and well adapted in skilful hands as a tractor to deliver the foetal head without injury to the mother or pressure marks upon the child." (See fig. 510).

1866. Pajot.

Professor Pajot was born in Paris in 1816, studied medicine in the Paris faculty and graduated in 1842. He became "Professeur libre d' obstetrique," soon after. In 1853 he became "agrege"; In 1862 after having been a lecturer to

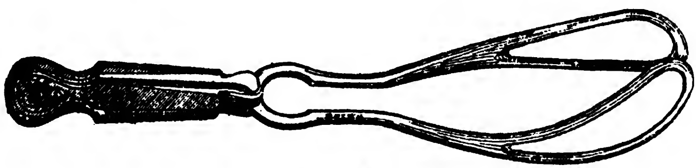


FIG. 509.
Barnes' Forceps.
(Weiss).

midwives at the clinique for ten years and acted as assistant to both Professor Moreau and Professor Paul Dubois, he was appointed regular Professor of obstetrics and occupied this post for 20 years. In 1883 he became Professor de Clinique Obstetricale et de Gynecologie from which chair he voluntarily retired in 1886. He was a teacher of his subject for nearly half a century.

He was the author of many papers on obstetric subjects. As a practical obstetrician he was almost unrivalled in France. He was an Honorary fellow of the obstetrical society of London. He died on July 25th, 1896 at Souppes (Seine et Marne).

The following short description of Professor Pajot's forceps is quoted from the catalogue of instruments exhibited at the conversazione of the Obstetrical Society at London. "Pajot's Jointed forceps resemble Charriere's but have at one extremity of the handle a blunt hook, at the other a thread of

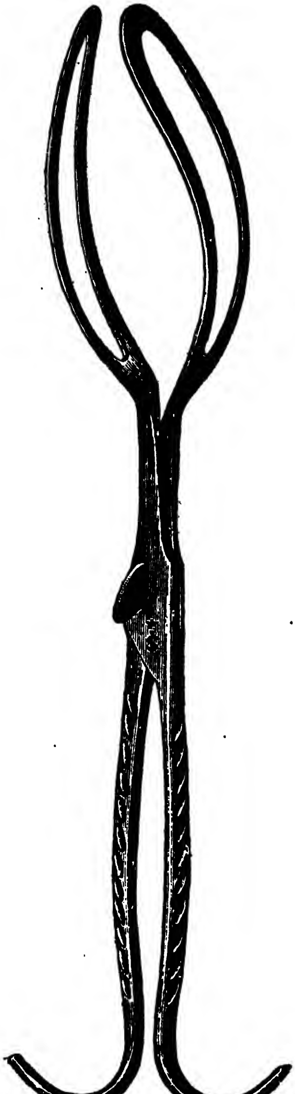
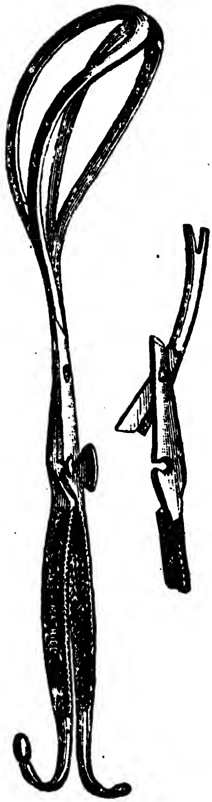


FIG. 510.
Wallace's Forceps.
(Jetter and Scheerer).



FIGS. 511-2.
Pajot's Forceps (Jointed).
(Witkowski).

silk, terminated by a leaden ball, for the purpose of Embryotomy, as recommended by the inventor." The method of dismounting" Charriere's "forceps is very simple and solid and permits also of the adaptation of the blades of various forms and sizes without augmentation of volume." For measurements see appendix.

Poullet* gives the following description of Pajot's forceps. "Prof. Pajot has made the instrument very portable by breaking up each branch and inventing a method of reuniting them absolutely firmly. The fragments can be mounted and unmounted with surprising facility. Moreover blades of two sizes can be mounted on the same handles the small ones for application to the head at vulva or in the cavity of the pelvis, while the larger ones to catch the head at the superior strait.

The forceps, we possess, is 46 cm. long, the blades being 25 cm. the pivot, 1 cm. and the handles 20 cm. The tip of the blades lies 88 mm. above a horizontal plane. The greatest width of the blades lies at about 4 cm. from the extremity and measures 5 cm. The width of the fenestræ is 3 cm. When the branches are articulated the distance between the tips of the blades is 1 cm. The sinus of the blades at the maximum point is 7 cm. The weight of the instrument is 820 grammes. In addition to the cephalic curve the instrument had also a pelvic curve, as originally suggested by Levret but wrongly accentuated by Dubois. The extremity of the handle is curved in the form of a hook which may be applied to the groin of fœtus for traction." (See figs. 511-2).

Pajot, realized that the forceps were too long to be portable, and attempted to make them less cumbersome. To solve the problem, he had the branches folded. Other authors had the same idea but were not successful in producing an instrument, rigid enough to be useful. But Charriere, from instructions from Dr. Pajot, succeeded in breaking the forceps, without the loss of any rigidity. The tenon round which one half of the branches revolves on to the other and the screw,

*Diverses especes de forceps Par. J. Poullet, 1883.

which with small springs finally fixes the handle to the blades, leave nothing to be desired from the point of view of the rigidity of the branches. Pajot also constructed a small forceps for cases where the head is in the inferior strait. This forceps is only 32 cm. long.

The following description of Pajot's Forceps with Disarticulating Blades, appears in Doran's Descriptive Catalogue.

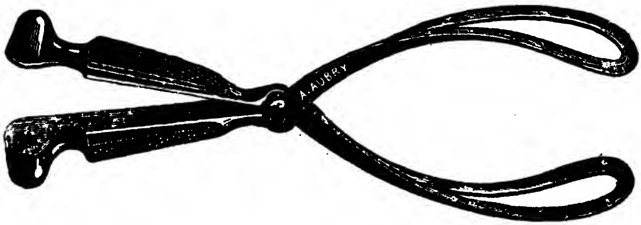


FIG. 513.
Pajot's Forceps
for inferior strait with lateral stud.
(Witkowski).

"French long forceps of the Levret type with modified handles and blades, which can be detached. The extremity of the left blades turns up and ends in an "olive" which unscrews exposing a free pointed end, which serves for a broad hook. The extremity of the left handle also turns up, it unscrews at its base, exposing a sharp perforator. The lock is of the modern French type, a button screw and a lateral mortise. The blades bear a strong pelvic curve and the fenestræ are wide. At the shank of each blade is a so-called "Pean's lock" which allows of its disarticulation and the substitution of a blade of a different size.

This *forceps a branches desarticulees de Pajot,* more shortly termed *forceps brise* is fully described with illustration in Charpentier's "Traite pratique des accouchments" 1870, vol. ii, p. 682-4, figs. 609-13."

For measurements see appendix.

1866. Lazarewitsch.

Prof. Lazarewitsch of Kharkoff, Russia, exhibited his forceps at the conversazione of the Obstetrical Society of London, held in 1866. For measurements of the instrument exhibited see appendix. The lock is in the handle and is in the form of tenon and mortise. The handles are made of steel, fluted with rectangular ends.

The halves of the instrument were not crossing.

"The inventor claims for these, the following advantages: (1) Owing to the halves not crossing, it is immaterial which blade is first introduced (2) Each half can be applied with equal facility the first one introduced, not being in the way of the second. The inventor considers this an especial advantage in cases where the head is high in the pelvis and the vagina imperfectly dilated. (3) The lock being in the handle there is no fear of pinching the soft parts or including hairs. (4) When considerable contractive force is necessary, all hazardous pressure on the fœtal head may be avoided."

Since 1866, Lazarewitsch changed the form of his instrument several times, preserving however its essential qualities, viz., not crossing of the halves and easy locking. He read a paper on the obstetrical forceps, at the International Medical Congress, London, 1881, and described his *new parallel straight forceps* which besides having the essential qualities of his former instrument, was entirely without the pelvic curve. The new forceps, had a handle adapted for holding it conveniently and firmly. The lock consisted of a tenon, $1\frac{1}{2}$ in. in length and $\frac{3}{4}$ in. in breadth, rounded at the extremity and of a mortice allowing free entrance to the tenon. By means of a screw passing through a nut in the right half of the handle and pressing against the other half the blades may be diverged and kept either parallel or at an angle. This is situated 4 cm. of the lower extremity of the instrument. The length of the forceps is 31 cm. and it weighs 475 grammes. (See figs. 514—6).

The following descriptions are reproduced from Doran's Descriptive Catalogue.

Lazarewitch's Short Forceps: with pelvic curve.

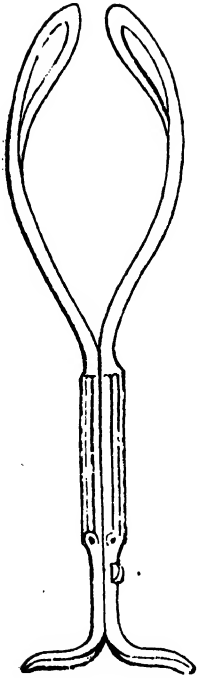
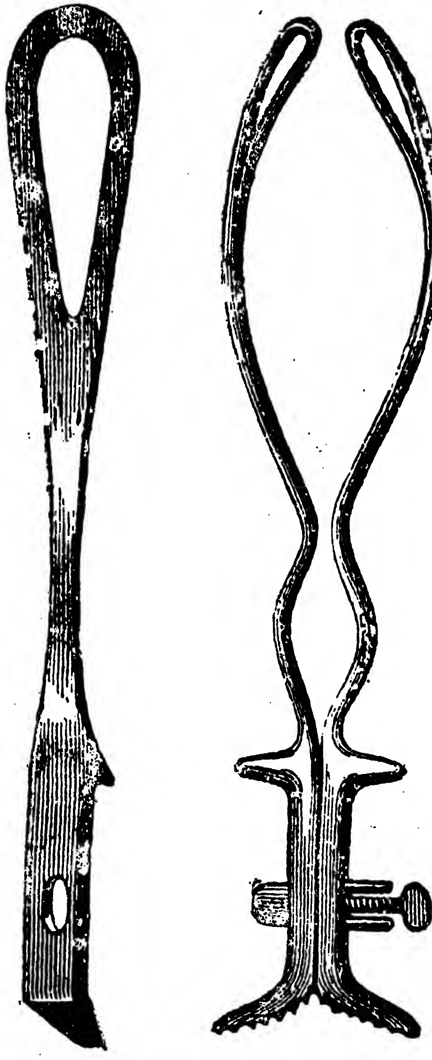


FIG. 514.
Lazarewitch's
Forceps.
(Obs. Soc. Cat.).



FIGS. 515-6.
Lazarewitch's
Forceps.
(Witkowski).

Handles with fluted rectangular ends to form a palm-rest, bearing externally a broad finger-rest in ivory and internally a tenon and mortise lock beginning within an inch of the lower extremity. The handles and blades lie parallel without crossing.

Blade with finger-ring of which the upper part is nearly in apposition with the corresponding part of the ring in the opposite blade; pelvic curve being above ring. Inner surface of blade quite flat.

The forceps described in the Obst. Society's Catalogue was 13¼ inches long, being thus longer than this sample, and bore no ivory finger-rests and had no finger-ring, the blades diverging immediately above the handles forming a wide curve between the lock and the free ends of the blades. Like this sample, on the other hand, the forceps described in the Obs. Soc's. Catalogue had a pelvic curve. Lazarewitch's name is now associated with the abolition of the pelvic curve.

LAZAREWITCH'S STRAIGHT LONG FORCEPS.

This instrument resembles the inventor's short forceps with pelvic curve in that the blades are parallel not crossing each other and the handles have flattened rectangular ends to form a palm-rest. Its limbs are made purely of steel with no ivory coating, the handles each bear a flange or finger-rest an inch long and slightly concave on the upper surface. To the tenon and mortise, a screw is added to prevent undue pressure on the fœtal skull.

The blades bear a kind of finger-ring, longer and narrower than on the short curved forceps; inner surface of blade flat.

LAZAREWITCH'S STRAIGHT LONG FORCEPS WITH CROSSED HANDLES.

This instrument differs entirely from the inventor's straight long forceps and from his short forceps with the pelvic curve, in having crossed instead of parallel blades. As in both these instruments, the angles have rectangular ends (not, however, in this case, fluted) to form a palm-rest. Like

the long forceps each limb is made of steel, with no ivory coating. The handles cross at two points, first, at one inch (2.5 cm.) above the palm-rest and blade, two inches (5.08 cm.) higher. Between the joints the left blade, reduced in thickness in front and behind, described a semi-circle with its concavity inwards. The right also describes a semi-circle between the joints with its concavity inwards and it bears a long opening into which the semi-circular portion of the opposite blade is received, when the blades are locked. Then the opposed semicircles leave between them a circular space about 1¼ inch (3. 17 cm.) in diameter.

The shanks are over 3 inch. (7.6 cm.) long, and not very divergent; they are not distinctly divided from the blades, which bear no pelvic curve.

This instrument is not figured in "Arsenal Obs." This sample was presented to the Obs. Soc. by the designer in 1893.

1866. Inglis.

Andrew Inglis, Accoucheur to Edinburgh New Town Dispensary modified the handle of the midwifery forceps, with "reference to the form commonly adopted in mechanical contrivances where strong manual traction is required."

He constructed two pairs of forceps. "The small pair (fig. 517) was made first. The measurements of this pair are from A to D, 10 in; from A to C, 4 in; from A to B. 3.5 in; breadth of handle 2.5 in; Weight, 13 oz.

Though quite pleased with the grasp and power of this short pair, I found one disadvantage connected with its shortness. The distance from the tip of the blade to the lock is only 6½ inches, so that great care is required in the high operation lest a small piece of skin be nipped in the lock. To obviate this I constructed another pair (fig. 518) in which the distance from tip to lock is about 8 inches. The increase of length in the blades, however, increased their leverage and the handles had also to be lengthened proportionately ; to prevent any chance of slipping, to effect this, the horns were removed to the requisite distance from the lock. The handle then (if

made like that of the first pair) was not much shorter than in an ordinary pair. This length, at last, I managed to get rid of by extending the horns laterally so that the cross pieces should fill the hand. The measurements of the long pair are: from A to D, 10.3 in; from A to C, 4.4 in; from A to B, 2.2 in; breadth of handle, 4.5 in. Weight 14 oz.

Fig. 1. Fig. 2.

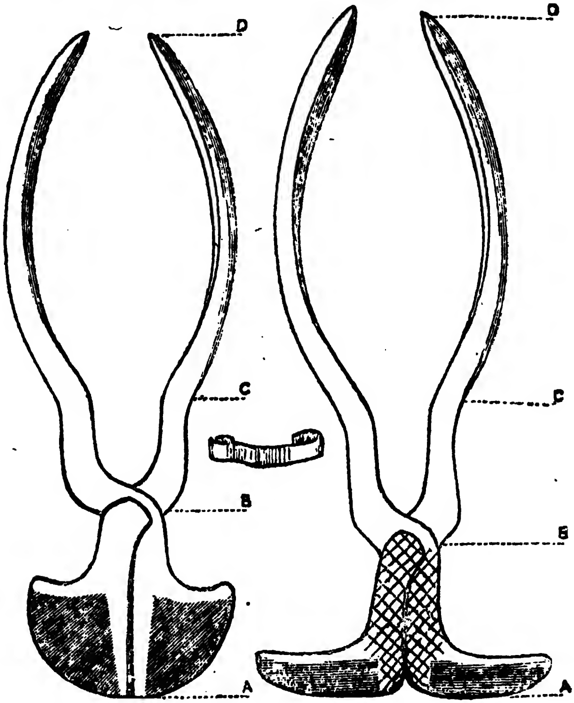


Fig. 517. Fig. 518.

Inglis's Forceps.
(Lancet).

I have contrived a link which can after the forceps are locked, be applied at the point marked C and which totally prevents any slipping. (See figs. 517-8).

The advantages which this plan of shortening the handles of midwifery forceps possesses are (1) greater portability, (2)

greater facility for introduction, (3) improved power of guiding the traction."

1867. Buzzell.

John Buzzell was born in Cape Elizabeth, Maine, on November 18, 1826. He, by his own earnings, made his way through the Academies at Portland and North Yarmouth, attending medical lectures at the Harvard Medical School and graduating at the Medical School of Maine in 1850. He then settled in Cape Elizabeth and soon had a large practice. In 1858 he left his work and spent several months in New York to obtain the latest medical novelties. Returning thence, he moved to Portland, Maine where he practised for the rest of his life.

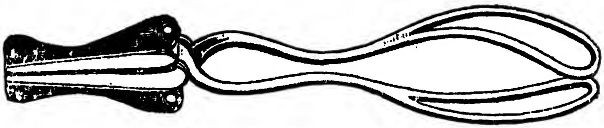


FIG. 519.
Buzzell's Forceps.
(Tiemann).

He suffered from childhood with caries of the femur which crippled him and left him with a shortened leg for life.

He was very skilful as an obstetrician, invented a new forceps (fig. 519) and was one of the earliest physicians in Portland to bring forceps into general use. He did some excellent ovariotomies before the days of asepsis, performed several amputations and was skilful with the knife but did not like to use it.

He read two excellent papers, one on the use of the forceps and the other on amputations before the Maine Medical Association.

He was exceedingly fond of travelling, enjoyed a trip to Europe and was clever as a musician. In his later years he suffered from enlargement of the heart and died very suddenly on April 10, 1890, while ascending the stairs in a patient's house.

1867. Joulin.

Joulin was the first to apply the idea which Bernard of Apt had made use of in 1853 of utilising the dynamometer in labour. Until 1883 his dynamometer has probably been the only means of mensuration employed. The apparatus of Joulin, which he named "aide-forceps," was very defective. It is difficult to understand why Joulin put the transverse bar in front of the forceps, which prevented all upward movements and the head descended backwards to the great prejudice to the maternal soft parts, which become abnormally distended. The two first cases were unfortunate and Joulin gave up the use of his "aide-forceps."

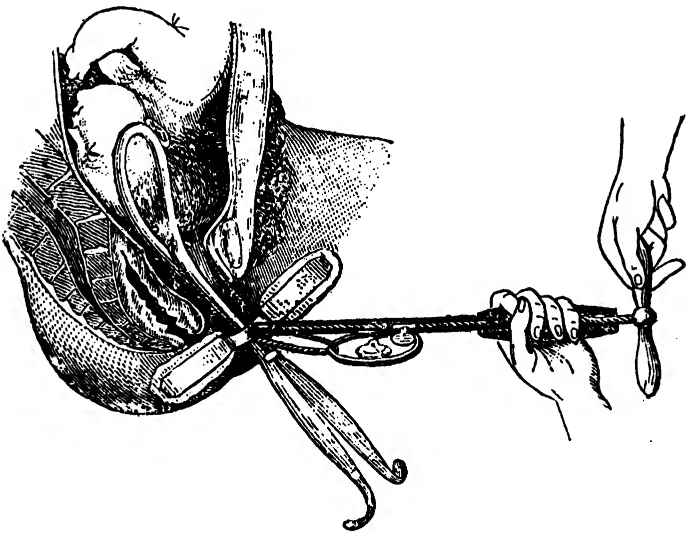


FIG. 520.
Joulin's "Aide-Forceps".
(Witkowski).

This instrument is composed of: (1) A steel rod, 13 inches long, in which turns a second rod, as the handle is revolved.

(2) A fulcrum of metal which is applied to the ischiatic tuberosities of the woman.

(3) A small dynamometer which measures the force applied.

(4) Finally, a filet .19 of an inch in diameter. The instrument is furnished with an ecraseur, which articulates with the canula and may be worked by means of the Chassagny or Maisonneuve chain.

The forceps, whatever the model, having been applied to the fœtal head, the filets are passed through the fenestræ. The metal disk, articulated with the canula is placed over the ischial tuberosities of the woman. The ends of the filets are attached to the dynamometer, and this is fixed to the stem, which moves when the handle of the canula is turned. The filets act doubly ; they not only pull the forceps but they

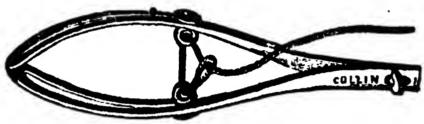


FIG. 521.
Disposition of traction cords
in Joulin's "Aide-Forceps".
(Witkowski).

approach the blades so that the pressure exerted on the fœtal head is certain and is measured by the dynamometer. The canula must be held horizontally.

1867. Niles.

A. Niles described a pocket obstetric forceps, before the Illinois Medical Society.

1868(?). Delore.

Delore used a method of traction by means of pulleys. At a distance from the bed of the patient, he had a plank carrying a screw-ring put on the floor. Two or three people mounted on this plank to keep it steady during tractions by pulleys. (See fig. 522).

This method was employed by Tarnier a short time after without knowing that Delore had already tried it.

1868. Aveling.

James Hobson Aveling was born at Whittlesea, in Cambridgeshire, on January 25th, 1828 and died in London on December 12th, 1892, at the age of 64. His death was ascribed to an attack of typhoid fever of ten days duration. He studied medicine in Aberdeen, became M.R.C.S. (Eng.) in 1851, M.B. (Aberd.) in 1856 and M.D. (Aberd.) in 1857.

In 1852 he commenced practice in Ecclesfield about 5 miles from Sheffield and in 1856 he established himself in Sheffield itself. From the first he devoted himself to gynæcology and he was soon appointed Lecturer on Midwifery and Diseases of Women and Children in the Sheffield School of Medicine. He was instrumental in the establishment of a special hospital for women in 1864 with 12 beds in a house altered for the purpose in Figtree Lane, Sheffield. In 1878 the hospital was transferred to new quarters, provided by Mr. Jessop. It now contains 116 beds and is called the Jessop Hospital for women.

In 1868 he left Sheffield and settled in Rochester where he stayed on till March, 1871, when he removed to London settling in Upper Wimpole Street, where, he remained until his death. Through his efforts the Chelsea Hospital for Women was opened with 8 beds by the end of 1871. The hospital which is now a flourishing institution with 50 beds and palatially housed in Fulham Road, counts amongst its staff, Robert Barnes, Aveling, Spencer Wells, Jonathan Hutchinson and took its rise in a small rented house in the King's Road, Chelsea. Dr. Black, in an obituary notice of Aveling said: It may be worth mentioning as an illustration of Dr. Aveling's sagacity and foresight, that when he settled in London, he came to me and said that he knew it was essential for him to obtain a hospital appointment in London and that as he would not at his age accept a junior appointment and could not obtain a senior one, he had resolved to found a new hospital for women and had selected Chelsea as the most promising district. He resigned his appointment as Physician in 1886 and was appointed Consulting Physician."

FIG. 522.
Delore's method of mechanical traction by means of pulleys and cords.
(Witkowski).

He originated "the Obstetrical Journal of Great Britain and Ireland," took a prominent part in founding the British Gynæcological Society and took a deep interest in the education of midwives. He was one of the Original Fellows of the Obstetrical Society of London.

He was a voluminous contributor to medical literature, including the valuable monograph "The Chamberlens and the Midwifery Forceps"

He possessed great mechanical ingenuity and invented various gynæcological and obstetrical instruments, including his midwifery forceps.

He found time for intellectual occupation beyond the sphere of his own profession.

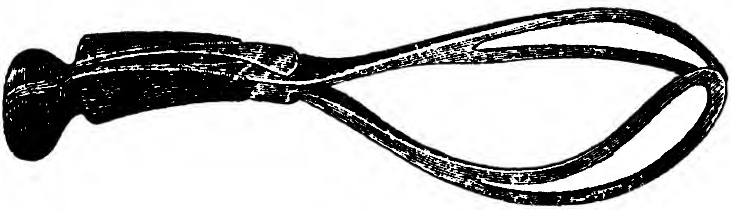


FIG. 523.
Aveling's Forceps.
(Jetter and Scheerer).

By his own wish often expressed, his body was cremated at Woking. As he expressed it he "wished to do the living no harm after his death, as he had tried to do no harm during his life."

Dr. Aveling exhibited a pair of midwifery forceps before the Obstetrical Society of London on March 4, 1868, "the handles of which were curved backwards. By this modification a better grasp is obtained in making traction. The handles are more out of the way of the operator in introducing and locking the blades and are also not interfered with by the legs of the patient when the head is passing over the perineum." (See fig. 523).

The following description is taken from Doran's Catalogue. "Handles strongly curved, lined with smooth ebony, big palm-rest, no finger-rest or flange, no shoulder, English lock,

blades with cephalic, pelvic and perineal curve, all marked, broadest near extremities, no shanks, distinct from blades."

For measurements see appendix.

In June 1878 Dr. Aveling read a memoir on "The curves of Midwifery Forceps, their origin and uses before the Obstetrical Society of London. He claims to have been the first to introduce the handle curve adding "Tarnier in 1877 invented his ingenious forceps which has the same sigmoid form as my own and which is undoubtedly theoretically excellent but practically far too complicated to come into general use." Further experience, however, showed that the Aveling type of instrument did not work satisfactorily and Tarnier's Axis-traction forceps soon became established. Dr. Aveling remarked in the course of a discussion that "in his instrument the

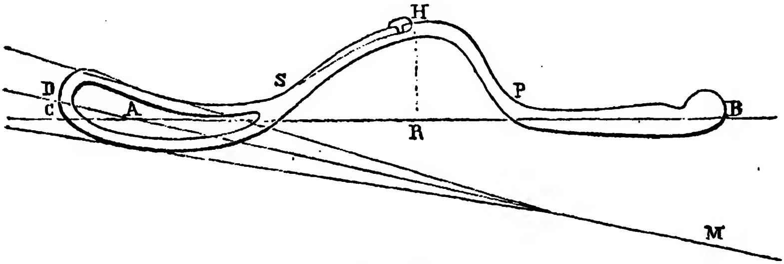


FIG. 524.
Morales' Forceps.

CB, axis of blades according to Morales; DM, real axis of the blades; HR, height of the instrument; SHP curved portion of the branches of the forceps; PB, handle; A, supposed centre of the fœtal head according to Tarnier.

handles were purposely made smooth, because traction was intended to be made from their hooks, the sides being used simply for compression."

1864. Morales.

Some years after Hubert announced his forceps, Jose Morales presented to the Academy of Medicine of Belgium, a forceps, based on the principle of Hubert, which he accomplished by other means than those employed by the latter. This forceps had a perineal curve of the handles, carrying

them back in the direction of the line indicated for perfect traction. This instrument was considered a modification of Hatin's forceps. (See fig. 524).

1868. Braithwaite.

James Braithwaite of Leeds showed before the Midwifery section of the annual meeting of the B. M. A. in Leeds, July, 1869 a pair of forceps modified by him. The instrument consists of "an ordinary pair of short forceps-blades, accurately adapted to one another—the convexity of one to the concavity of the other and connected firmly together in this position by a metallic clip which is easily removable when it is wished to separate the blades."

The blades, joined together, may be passed into the hollow of the sacrum and are then separated and glided one downwards and the other upwards. With exercising a little pressure, they will now lock. The blades may also be passed separately in the usual manner if thought desirable. (See figs. 525-526).

The advantages claimed for the instrument are:—(1) It is light portable and can be carried in the breast-pocket where it is invisible and where it cannot be lost in travelling. (2) Its application is much more rapid than that of the ordinary short forceps indeed I think 1½ or 2 minutes is generally sufficient. (3) Its introduction and application to the head may be said to be painless. (4) It is much safer to the child than the use of ergot. (5) It is unnecessary to disturb the position of the patient. (6) Compression is effected naturally the elongation of the head being assisted. (7) There is no risk of paralysis of the *portio dura*. (8) The instrument may be applied in the ordinary way.

The total weight with the clip is about 10½ ounces.

1869. Carof.

The forceps devised by Dr. Carof, Professor of Obstetrics at the Civil Hospital of Brest, can be applied absolutely like the others, when it is not necessary to have recourse to any system of articulation. The blade of each of the branch of

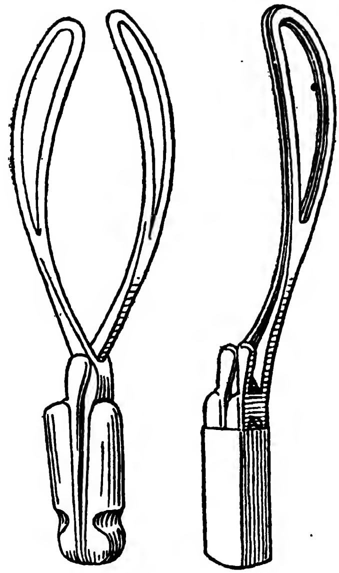


FIG. 525. FIG. 526.
Braithwaite's Forceps.
(Witkowski).

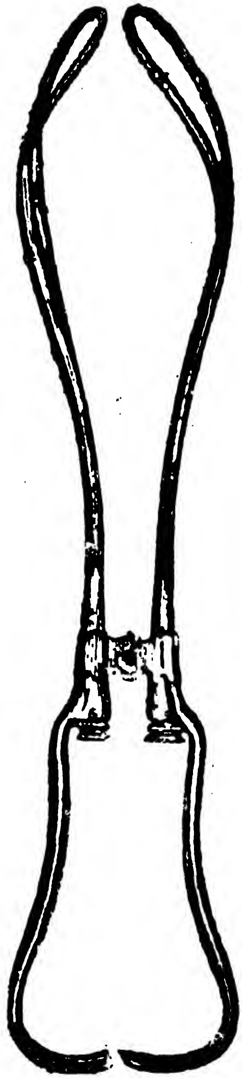


FIG. 527.
Carof's Forceps.
(Witkowski).

the instrument is independent of the handle. The articulation of the blade and of the handle as also the articulation of the branches together, can be made in different ways. (See fig. 527).

The author claims the following advantages for his forceps: (1) They are ordinary crossed forceps. (2) They articulate firmly and very easily in every possible position of the blades, whether parallel or not. (3) The blades, passing one over the other, can be introduced together. (4) Regular application can always be resumed, as slowly as desired and without disjointing or removing the blades and only by the movement which the obstetrician imparts to the handles. The instrument does not cease to be an instrument of prehension and of traction. (5) Uncrossing is avoided by the instrument being turned into a parallel-branched forceps. Then the pivot alone is placed underneath.

Wassiege considered these advantages as of little importance and commented on them as follows:—

(1) As they can be taken to pieces they are more difficult to clean, more complicated, and of a higher price than ordinary forceps.

(2) It is perhaps a little more convenient to articulate but it is only very rarely that the obstetrician fails to make the branches parallel.

(3) The branches can only be applied in a secure manner one by one.

(4) This is common to all forceps.

(5) Cases where uncrossing is necessary are so scarce, that it is useless to complicate the ordinary forceps.

1870(?). Huston.

Huston's modification of Siebold's forceps, is mentioned only in Robertson's paper on "Modification of the Obstetrical Forceps" in the Amer. Jour. of Obs. Vol. V. 1873. p. 293. No description is given.

1870. Hartman.

Hartman added to the forceps a rod like that of Hubert but he placed it above the lock. "If," he says, "the ordinary forceps is applied to the head at the brim, traction will not be made in the axis of the pelvis, but from above downwards and particularly forwards, and the tendency of the head, hence, is to press against the anterior wall of the pelvis."

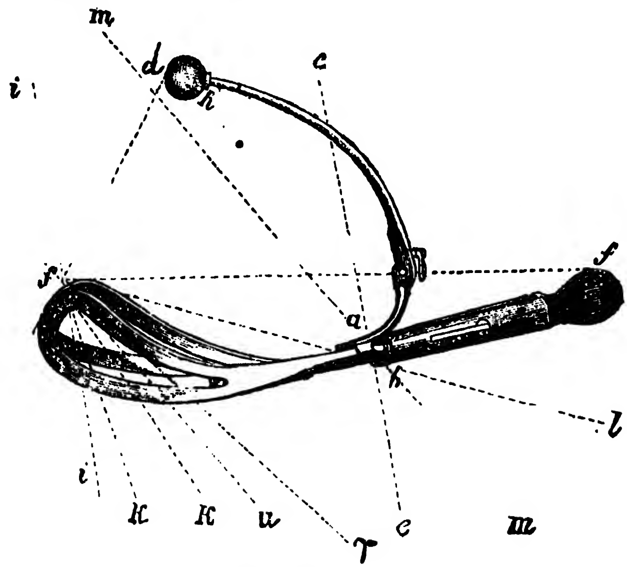


FIG. 528.
Hartman's Forceps.
(Charpentier).

"When however, the rod *ad* is applied, if the operator presses with his arm in the direction *e* to *e* through the lock, the action on the fœtal head will be at the same time from *i* to *i* and the resultant of the forces, is the diagonal *fl*. But since the operator does not press perpendicularly, but obliquely, that is to say, from above backwards, below and in front, about in the direction from *m* to *m*, the head is compressed from *u* to *u*, and the resultant is consequently the Diagonal *fr*. If, on the contrary, pressure be applied to the handle *d* of the rod *ad*, from in front backwards, the direction

of the pressure becomes *dff* and the direction of the traction remaining *ff*, the diagonal of the forces *ff* and *ff''* will become *fk*. If now we exaggerate pressure beyond traction, the diagonal will alter from *k* to *k'* and the head as it descends, will do so in the axis of the pelvis and will not press against the anterior pelvic wall." (See fig. 528).

1870. Miquel.

J. F. Miquel's original work is not available.

1870(?). Bauer.

Bauer's modified Naegele forceps is mentioned in Jetter and Scheerer's Catalogue of Instruments, p. 677.

1870(?). Richard.

This forceps is described in the New Sydenham Society's Lexicon, thus:—"An articulation resembling those of Smellie, but so adapted that one blade can be advanced or retracted beyond the level of the opposite blade."

1870(?). Tarsitani-Lollini.

An illustration of this forceps is given in Jetter and Scheerer's Catalogue. (See fig. 529).

1870(?) Braxton Hicks.

John Braxton Hicks was born at Rye in Sussex in 1823. At the age of 18 he entered as a medical student in Guy's Hospital. In 1847 he passed the final M.B. Examination of the London University and in 1851 took the degree of M.D. In 1859 he accepted the post of Assistant Obstetric Physician to Guy's Hospital and in 1870 became the senior obstetric physician and lecturer on obstetrics at the school. He continued to hold these appointments until 1883 when he was elected Consulting Obstetric Physician. In 1888 he acceded to a request to become obstetric physician to St. Mary's Hospital

FIG. 529.
Tarsitani-Lollini's Forceps.
(Jetter and Scheerer).

in succession to the late Dr. Meadows. This appointment he held for several years.

In 1862 he was elected a Fellow of the Royal Society. It was mainly his contributions to entomology and botany that obtained for him the coveted blue ribbon of science. His contributions to medical literature are too numerous to be recorded in detail. In looking through the list of his obstetrical and gynæcological contributions one feels that there must be few subjects on which he has not written something.

His name, however, is indissolubly associated with his method of "combined external and internal version."

He died at his residence, the Brackens Lymington, August 28th, 1897, at the age of 74 from heart failure after a long illness following an attack of influenza.

His long and short forceps are mentioned in an old edition of Down Bros'. Catalogue.

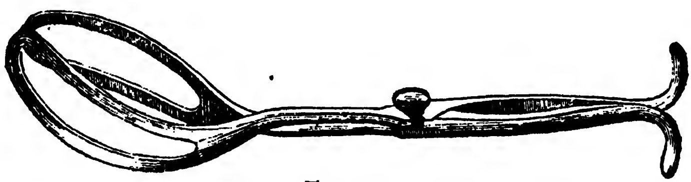


FIG. 530.
Winn's Forceps.
(Reid Bros.).

1870(?). Winn.

In a catalogue published by Reid Bros. of San Francisco is illustrated a Winn-Hodge forceps. (See fig. 530).

1870(?) Philadelphia.

Amongst the 17 varieties of forceps exhibited by R. P. Harris before the Obstetrical Society of Philadelphia on June 26, 1872, was one designated "Philadelphia" (*vide* Amer. J. Obs., Vol. V, p. 341).

1871. Gordon.

Dr. D. Gordon made a communication on a new kind of midwifery forceps before the Edinburgh Obstetrical Society on December 13, 1871. He stated "The separation of the blades from the handles of the obstetric forceps greatly facilitates their use; but the principal difficulty that of locking them, remains and is for the first time, entirely removed by the improvement which I have now to mention. It is simply this:—The handles hitherto separate, are *united* by a common circular or scissor joint. This is a feature in the instrument which, with the separate blades, is entirely new and renders its use more easy and accurate. Their proximate ends are so made as to slip easily into sockets united to them in the stems of the blades, to which they become securely fixed by catch-springs. When the blades are introduced and properly adjusted on the head, the handles, united, are readily applied to them and immediately the operator finds he has the head already firmly fixed in the grasp of the instrument and that all the difficulty of locking has been avoided. Another important improvement is that the blades are so much curved and fit the head so closely, that no space is left between them and the presenting part of the head. By this, the difficulty of extraction, especially when the outlet is narrow, and the danger of injury to the soft parts, are much lessened. The handles are of steel small and short but well curved, so as to give a secure hold."

1871. Barclay.

John Barclay, Assistant Professor of Midwifery, Aberdeen University, constructed a forceps, which combined the principle of Ziegler's male and female blades with the length, strength curves of blades and cross-stops of Simpson's. "The handles are precisely the same as Simpson's; the cross-stops are the same in form also as in his except that they are made to rise and fall at will, like the guard of a curving fork the shank and lock are Ziegler's, only much stronger; and the blades are male

and female as in Ziegler's, only they are of the same strength as Simpson's and have his double curve." (See figs. 531-532).

The measurements are:—"Length of handle, 4 in., from handle to the lock $1\frac{1}{4}$ in., from the lock to the beginning of

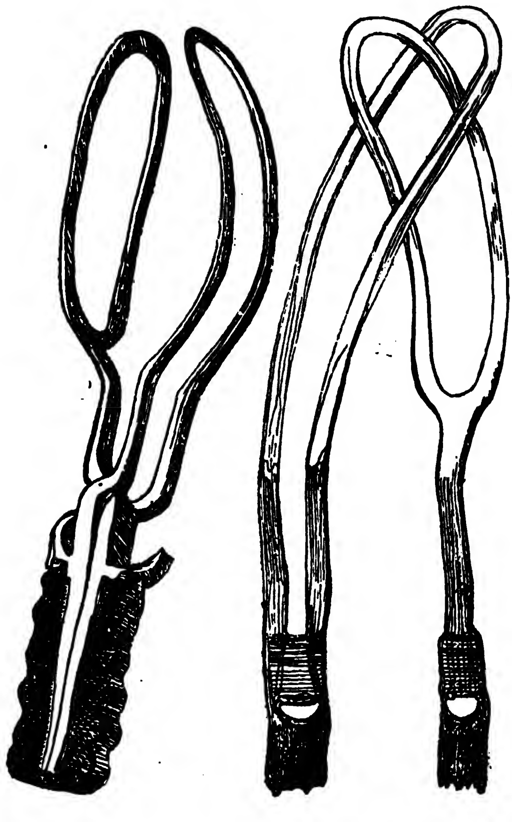


FIG. 531. FIG. 532.

Barclay's Forceps.
(Lancet).

the curve of the blade, 2 in.; and from the last mentioned point to the end of the blade $6\frac{3}{4}$ in.—in all 14 in distance between the points of the blades 1 in.

1871. Long.

After the publication of Barclay's account of his forceps in the Lancet of January 6, 1872, Mark Long, M.D., of Dalston, Cumberland, announced in the Lancet of January 20, 1872, that he had used, for nearly 4 years, a forceps similar in every essential particular to that descrbed by Dr. Barclay, which he had made after the pattern of one in the possession of Mr. C. E. Garman of Bow, Devonshire. He remarked "The only points of difference between the forceps I have and Dr. Barclay's are that in his the female blade is the under one, in mine it is the upper; in mine the cross stops do not move and in mine the handle is 5 inches in length, that is, one inch longer than in Dr. Barclay's; the measurements in every other particular being identical with those given by him, and the handles being similar." "I write this not with the intention of depriving Dr. Barclay of the credit due to him for having devised a forceps new to himself but to let the profession know that such a forceps has been in use for many years."

1871. Tauri.

A. Tauri described a new modification of forceps.

1872. Robertson.

F. M. Robertson, M.D. of Charleston, S. C., Professor of Gynæcology and Clinical Obstetrics in the Medical College of the State Carolina modified the obstetric forceps. His modification consists of a combination of the good qualities of the Hodge and Davis forceps. Robertson says:—"In the first place, I have adopted, without alteration the blade or clasp of the Hodge forceps, in preference to that of Davis's and others. I regard it as better adapted in every respect to the contour of the fœtal head and parturient canal of the mother than any that has come under my notice." (For specific advantages of this forceps see "Hodge").

"The blunt hooks to the handles of Hodge's forceps have been discarded and the handles from their extremities to the

lock, reduced from 6.8 to 4.5 inches, composed partly of steel and partly of wood. The handles of the Davis forceps............ measures 4 inches from their extremities to the locks. The entire length of the Davis forceps, from the extremity of the handles to the tip to the blades in a right line is 12 inches. From the lock to the commencement of the spring in the blade of the Hodge forceps in 3.5 inches. I have reduced this to 3 inches in my instrument, giving the entire length from the extremity of the handles to the tip of the blades, in right line, 13.5 inches; this distance in the Hodge instrument is 16 inches. As has been already stated there is no difference in the clasp or blades proper, of the Hodge forceps and the clasp or blades proper of my instrument. In the Hodge forceps, the length from the lock to the extremity of the blade is 9.5 inches; in the Davis instrument it is 8.5 inches; and in my instrument

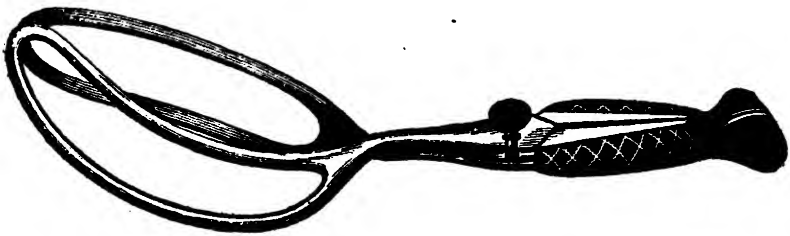


FIG. 533.
Robertson's Forceps.
(Tiemann).

it is 9 inches. The combined handles and shanks in my instrument—that is from the extremity of the handles to the spring of the clasps or blades proper, forms a right line. The lock is the same as the Hodge forceps. The pelvic curve in my instrument is greater than that of the Hodge forceps, bringing it, I think, more in accordance with the true curve of the parturient canal." (See fig. 533).

The forceps are made of best tempered spring-steel and weighs 15 oz.

The following description of a sample of Robertson's (?) Forceps, in the museum of the R. C. S. is given in Doran's Descriptive Catalogue.

"This instrument resembles Ramsbotham's long curved forceps, but the shanks are somewhat shorter and wider apart and the pelvic curve more marked, whilst the inner surface is flat, not slightly convex. There is no finger-rest, but a shallow shoulder is formed by the metal everted on the upper border of the wooden coating.

Apparently a modification (English instead of Brunninghausen lock) of F. M. Robertson's instrument, figured and described in a pamphlet, "On a modification of the Obstetrical Forceps," New York, 1872. The original pattern was David Davis's forceps with symmetrical blades bearing wide fenestræ, which Hodge of Philadelphia imitated, reducing the fenestræ whilst Robertson made the shanks shorter and the remainder of the blade relatively longer. In this instrument, about which there is some doubt, the space between the shanks is much wider than in typical instruments above referred to."

1872(?) Rohrer.

Rohrer's forceps was one of the 17 varieties exhibited by R. P. Harris before the Philadelphia Obstetrical Society on June 26, 1872. No description or diagram is available.

1873. Vacher.

Dr. Francis Vacher of Birkenhead modified the short forceps as follows:—"The instrument may be described as consisting of two blades or claws essentially the same as those of ordinary short forceps, except that the lower blade is slightly shorter than the upper, being adapted to lie within it when the instrument is closed. At the lower extremity of each blade, bent at an acute angle to its convex surface is a handle rounded off and slightly curved like a small horn. The handles are of black wood chequered according to the first pattern but smooth in the second as Vacher found that rough handles were hard to clean—but the bases which are perfectly flat, are faced with steel, as are also the parts directed towards the blades, the steel being continuous with the blades. Along one edge of the handles' bases and extending into the shanks of the

blades, is a stout hinge." A strong steel strap projects from the free end of the handle, attached to the upper blade, it runs along free border of the blade, ending close to the hinge in a catch, which fitting into a groove in the opposite handle locks the blades when *in situ*. The hinge rivet, in this second pattern is fitted with a head so that it may be readily withdrawn as "should delivery prove impracticable after the child had been sufficiently long dead, it would be an advantage to be able to separate the blades and remove them, right and left in the ordinary way." (See figs. 534-535).

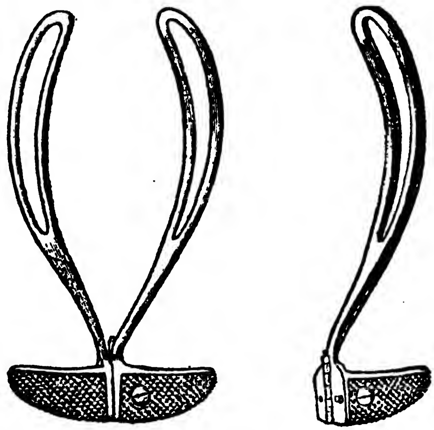


FIG. 534. FIG. 535.
Vacher's Forceps.
(Braithwaite's Retrospect, 1873).

The edges of the blades and fenestra are neatly bevelled off and the upper or outer blade projects beyond the other sufficiently to prevent the possibility of the soft parts of the mother being caught. It should be mentioned also that the blades, when the instrument is closed only lie perfectly close at the lower margin; along the whole length of the upper margin, they are separated about an eighth of an inch—an arrangement necessary to enable the blades to pass one another."

"I do not claim to have invented a new short forceps .... but I do claim to have devised a lock more

suitable for the short forceps than Chapman's, Ziegler's or the German lock or any modification of either of these and a folding handle, like a cork-screw handle, meant for traction only. Both lock and handle are new, so far as I know."

Vacher maintained "that the simple transverse handle was better adapted for traction, less cramping to the hand less fatiguing to the operator than any other, not excepting the handles with short cross-stops," (finger-rests). Traction is effected without compression; it is smaller lighter(?) and more portable than any other form of forceps; it does not alarm the patient cannot fail to lock and cannot slip. "It is a vectis no less than a pair of forceps and when folded may be used as that instrument to assist the extraction of the head, correct malposition and as a lever tractor, the operator making a fulcrum of his left hand and drawing with his right."

Mr. Draper thus comments on Vacher's forceps in the Obstetrical Journal, Vol. III., p. 716.:—"In Mr. Vacher's forceps the handle is small and spindle-shaped, affording but a slight and uneasy hold for the hand; in the middle of the handle there is a projecting knob, the proximal end of a hinge bolt: this knob forms a most inconvenient obstacle to the hand when the handle is grasped. Then, again, at one end of the handle there is an awkward lever, connected with a catch which locks the handles together. This lever projects considerably beyond the handle and therefore forms another object of discomfort to the operator's hand; moreover, the projection is very apt to catch the bed clothes or the patient's dress, the result of which would be that the lock would be set at liberty and the blades would lose their hold of the fœtal head."

"In describing these points I do not at all wish to detract from the value of Mr. Vacher's forceps, my only aim being to remedy defects and to introduce a more perfect and convenient instrument."

The following account of a sample of Vacher's Cross-handled forceps, in the museum of the R. C. S. is taken from Doran's Descriptive Catalogue.

"This sample is of the second pattern, with blades, etc., rather larger than the first and with smooth wooden handles. Length across both handles when fixed 4½ in. (10.7 cm.) breadth ¾ in. (2 cm.).

Vacher's forceps did not prove satisfactory. The blades were introduced superimposed and one blade was then revolved round the fœtal head but the soft parts of the mother and child were too often carried with it and moreover the blades were apt to lock. The cross handles came too close to the external soft parts, which were sometimes damaged and the hinge was difficult to keep clean."

For measurements see appendix.

1873. Madden.

Thomas More Madden, M.D., F.R.C.S., Ed., was Assistant Physician, Rotunda Lying-in Hospital, Master, National

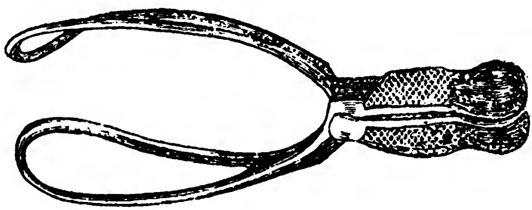


FIG. 536.
Madden's short Midwifery Tractor.
(British Medical Journal).

Lying-in Hospital and Obstetric Physician and Gynæcologist Master, Misericordiæ Hospital, Dublin.

His short straight forceps weighs only eight ounces. "It is 10 inches long, the blades being 6 inches and the lock and handles 4 inches. The greatest space between the blades when locked is 2⅞ inches and between the points 1¼ inch. Particular attention has been paid to the avoidance of any sharp edges or points. The curve of the blades is by no means as sharp as is the case in the ordinary forceps and commences ½ inch above the lock, the intervening shanks being bevelled internally and bent outwards, so as to form a space for the finger of the operator. The fenestra which extend throughout

the blades, are very wide so that the scalp may protrude and cover the rims thus protecting the maternal passages during the extraction." (See fig. 536).

His short forceps is thus described in Doran's Descriptive Catalogue.

"Handles coated with roughened ebony, stout and short, palm-rest, shoulder formed by upper end of wooden coat, but no finger-rest.

Blades part immediately above lock, no shank moderate even curve; inner surfaces (borders of fenestræ) distinctly concave.

The instrument was a very powerful tractor and was intended only for cases of delay in the second stage of labour. It might be used with wonderful facility as well as power."

The long forceps is a somewhat complicated-looking piece of mechanism and combines the action of a powerful lever and tractor with those of a compressor. This is a double curved instrument, the weight being 26 ounces and the length 18 inches. The blades occupy 10 inches, of which 7 are taken by the fenestrated portion and 3 by the shanks. The greatest space between the blades when locked is about 2¾ inches. The lock and handles are 8 inches long. The latter are movable and thus it is made portable. To the handle a rack and pinion is attached and these are connected by a screw which regulates the amount of pressure exercised on the child's head. The traction power of the instrument is increased by strong shoulders and owing to the length of the shanks, there is no danger of nipping the soft parts during the locking. The curvature of the blades is less acute than in ordinary forceps, in which it is generally that of a section of a circle, so much larger than the fœtal head, that the instrument is in contact with the head, at only two points, on which excessive pressure must be made and from which it is liable to slip; whereas in this forceps the blades were carefully moulded on a number of average-size fœtal heads until a curve was obtained which allows the most perfect apposition between the blades when *in situ* and the child's head. Thus the possible injurious effect of the compressing power of the instrument as well as the

danger of its slipping are both reduced to the minimum. (Lancet June 20, 1874, p. 865).

Madden showed his long forceps before the section of obstetric medicine of the British Medical Association at its annual meeting held at Glasgow in 1888 and remarked as follows:—"The second instrument shown is intended only for cases of difficulty from disproportion or pelvic flattening. The blades are therefore of considerable length and strength and are approximated by a powerful screw by which the amount

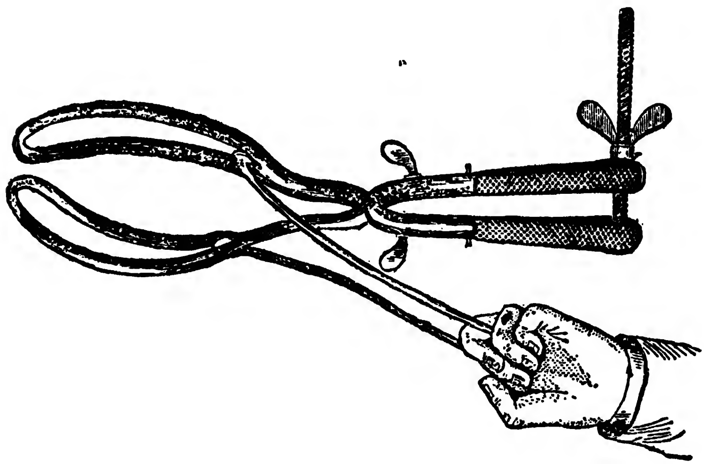


FIG. 537.
Madden's Compressing Double Forceps.
(British Medical Journal).

of compressive force exercised may be exactly regulated. The appended traction-rods are closed or separated by a simple and novel mechanical arrangement. They can be applied to any other forceps and include in their handle a case for hypodermic syringe and discs. This instrument is not only a tractor and lever, being convertible at will into a short forceps by removal of the compressing handles, but in its entirety, where these are affixed is moreover a compressor of great power by which the fœtal head may be gradually moulded out or compressed within the limits of viability, so as to admit of delivery through

pelves from which living children could hardly be otherwise extracted." (See fig. 537).

1873. Lowenthal.

H. Lowenthal of New York in presenting his instrument before the profession, made the following statements:—"I tried to find out how it were possible to apply a forceps with-

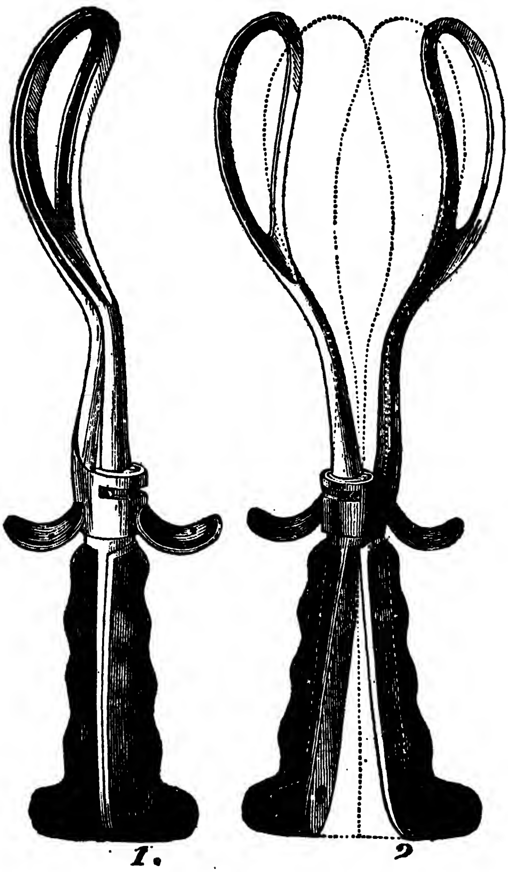


FIG. 538. FIG. 539.
Lowenthal's Forceps.
(Tiemann).

out subjecting the mother (and often the operator) to the difficulty of applying the second or right blade and locking the forceps; in other words I tried to find a forceps where blades could be introduced at once and by which the head of the child could be caught by rotating one blade around and away from the other."

"I shall now endeavour to show in what way my instrument is superior to all the others. The forceps should act as a tractor, as compressor and as lever and I think the arrangement of the lock of my forceps meets these claims best of all."

"The lock being solid and stationary, is more apt than any other to procure for the operator a steady traction; the blades working around a joint will give a higher degree of compression than any other, and the whole instrument being straight and the handles working as it were like one piece will give a greater amount of leverage than any instrument the handles of which have to be compressed by the hands of the operator in order to steady the instrument." (See figs. 538-539).

"These are a few new points to be remarked in my instrument. First of all, it does away with the introduction of the second blade. .... You introduce your instrument as you do the first blade of any of the other instruments. There is usually very little resistance ; then seize hold of both handles with one hand and rotate the instrument either to the right or to the left, either around the anterior or the posterior half of the pelvis and as soon as the two blades come opposite to each other, with a click the lock will close and you can commence traction or use leverage, at your discretion as the case might be, without fear lest the instrument might open or the blades might move and without using any force to compress the handles as with other instruments. This instrument as I present it now, could be made of any length, but I intend to use it as a straight forceps and shall always follow the old rule of putting the mother across the bed on her back, bringing the nates close to the edge, thereby giving the most space to the operator."

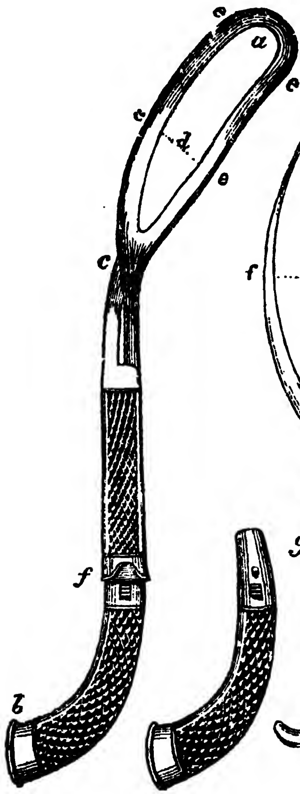
1874. McBride.

Alex. McBride of Berea Ohio considers all or nearly all the forceps to possess one or more of the qualities of frightfulness, awkwardness, inefficiency or destructiveness. He modified the instrument in order to make it (1) less objectionable in appearance (2) more easy of application and (3) less liable to do harm.

To divest the forceps of their uncouth or frightful aspect, it must be shorter, lighter and present a less "martial" appearance. The handles could not consistently be shortened and maintain the same length of shanks and shortening of the latter was not admissible unless a joint or lock could be contrived which was not liable to pinch. To effect that object I have contrived a convenient and secure lock which cannot pinch under any circumstances. I have reduced the shanks to two inches, the handles to 3½ inches, thus making an instrument, the entire length of which, in a right line, is 11¼ inches, capable of being used at the upper strait. To this I have added adjunct handles which when used for difficult cases, increase the entire length to 15¼ inches.

The next point to be attained was to produce a blade with all the facility for grasping and traction which pertains to the best instruments in use, such as Davis's or Hodge's and to lop off redundancy, all that might interfere with its perfect ease and safety of application. Now, when traction is made, no part of the instrument touches the head except the portion of the blades which is forward of the point of greatest expansion. Hence it is plain that no width of blade posterior to that point can make any difference in the safety and facility of extraction or firmness of hold. But it is easy to comprehend that a considerable width of this portion of blade may interfere seriously both with the safety and ease of introduction. With these views of the case, I have given my blades ample width (1⅝ inch) from near the tips to a point 3¼ inches from the tips, in a right line and from this point; they rapidly decline in width to the shanks. This wide portion of the fenestra admits of the protrusion of the parietal protruberances,

Mc Bride's Forceps.
(Illustration drawn from first pattern).
Amer. Jour. of the Med. Sciences).



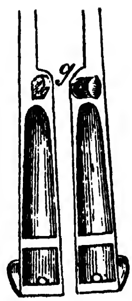


FIG. 540. FIG. 541. FIG. 542. FIG. 543.

Fig. 540. Side view. Length, a, b, in right line $15\frac{1}{4}$ inches; a, c, 6 inches; a, d, $3\frac{1}{4}$ inches. Width, e, e, c, c, $1\frac{7}{8}$ inch. Width of limb $\frac{3}{8}$ inch. Width of fenestræ $1\frac{1}{8}$ inch. Limbs bevelled on outer edge of pelvic surface.

Fig. 541. Adjunct handle, same as f, b, in fig. 540.

Fig. 542. Front view. Length, a, b, $11\frac{1}{4}$ inches in right line; a, c, 6 inches; a, d, $3\frac{1}{4}$ inches. Width, e, f, 3 inches. Shanks, c, g, 2 inches. Handles, g, b, $3\frac{1}{2}$ inches. Between tips, h, h, $\frac{7}{8}$ inch. Thickness of limb at e, f, 5/32nd of an inch. Distance between handles at joint about 5/32nd of an inch.

Fig. 543. Opposing face of adjunct handles, showing mode of locking.

McBride's Forceps.

(Illustration drawn from an improved pattern).
(Amer. Jour. of Med. Sciences.)

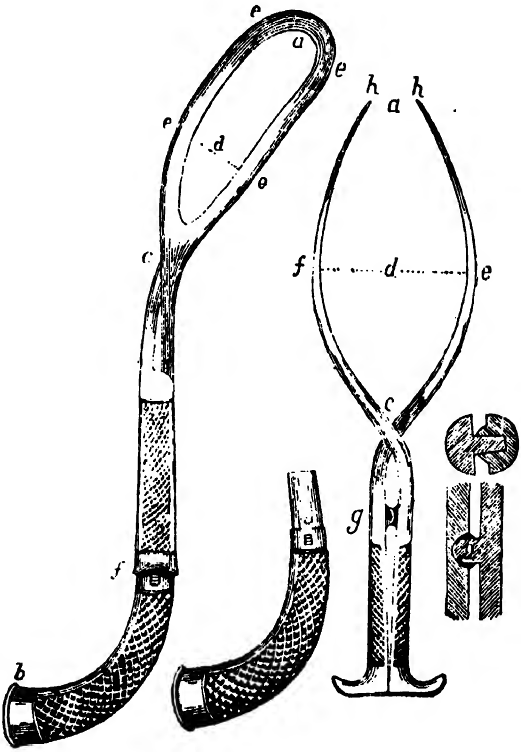


FIG. 544. FIG. 545. FIG. 546. FIG. 547.

FIG. 544.—Side view.

FIG. 545.—Adjunct handle.

FIG. 546.—Front view.

FIG. 547.—Mode of locking of adjunct handles. Longitudinal and cross section.

retaining all the advantages of the wide blades of Davis and Hodge and discarding the disadvatages of their width of heel portion. The length and cephalic curve of this portion of the blades are such that the tips can never endanger the perineum by extending beyond the chin, their maximum extent being $3\frac{1}{4}$ inches from the perietal protruberance, which can never reach the chin.

To improve the pelvic curve was another point of consideration, so that when the blades are on the head at the upper strait, the shanks or handles shall be in the centre of the Os externum. The reason for this is two-fold first, the better to preserve in the mind the position of the head and the true line of motion; second, to avoid the pressure of the handles against the perineum and in many cases to avoid the necessity of moving the patient from her dorsal position in bed. To accomplish this I have commenced the pelvic curve at the joint so that the axial curve is uniform from the joint to the tips of the blades, thus increasing the length of the ordinary curve 2 in. and rendering the curve of the blade more gentle than in many instruments; this has the effect to throw the handles more forward and in effect to increase their length about one inch. The curve is an arc of a circle, whose radius is 9 inches projected from a line perpendicular to the joint and supposed to be very nearly the average curve of axis of pelvis. With these conditions the short instrument can be easily applied at the upper strait and give sufficient projection of handles to afford a good hold.

But to provide for those cases in which much leverage, traction or rotation is required, I have provided supplemental handles, when these are inserted we have a veritable long forceps of about the usual length, each branch as firm as if it were one solid piece. And here I have innovated; the adjuncts curve downward nearly as much as the blades curve upward; at least the point of traction near the end of adjunct is about the same distance below the joint, or axis of the handles, as the point of resistance is above (which is a point about $1\frac{1}{2}$ inch forward of the point of widest expansion).

This arrangement gives us the advantage of making traction directly in the line of motion during the entire passage of the head, without distracting the attention or requiring a hand to make downward pressure on the shanks or handles. Another advantage of the downward curve is that it affords a lever of three inches in length for rotation; this peculiarity of the instrument pertains to no other in use, Hodge's handles curving downwards in only a slight degree. We have then, in this instrument, all the advantages of both a long and a short forceps, without the disadvantages of either. The short instrument has the advantages of lightness, portability, mildness of appearance and in its application does not confuse by length and weight of handles. The long instrument has the single advantage of greater power. My short instrument will answer in all cases not requiring great power of traction or rotation. It is my method to begin all operations with the short instrument; then to attach the adjuncts when required. They can be inserted in less time than is required to take from the pocket and put on a pair of spectacles.

It is not my design to criticise other forceps, but the observer will perceive that the length of the blade and cephalic curve are such that when the head is grasped ($3\frac{1}{2}$ inches), the tips will approximate to $1\frac{3}{4}$ inch, and will be nearly $\frac{1}{2}$ an inch from point of chin. The measurement of width of chin is about $1\frac{1}{2}$ inch; therefore this instrument will hold more firmly than one whose tips are 2 inches apart when the head is grasped. The more accurate the fit, the less pressure is required for extraction.

My instrument when short has a grasping or crushing power, as compared with Hodge's instrument, of .737 to 1.172, being less; when long, as 1.473, being more; but as it has a crushing latitude of only $\frac{1}{2}$ inch on the average head, no inconvenience or damage can result. Hodge's instrument has a crushing latitude of 1 inch, its width, when closed, being but $2\frac{1}{2}$ inches.

Some practitioners may fail to perceive the full importance of having the forceps dual, or short and long. I think with the truly humane it must ever be a maxim to not only spare

the patient all unnecessary danger and physical pain, but all mental and moral shock; hence, the less alarming the appearance of the instrument, the better. And if the maxim of Hodge be acted upon, that "the forceps ought to be applied and used without the consciousness of the patient," the instrument of $11\frac{1}{2}$ inches length and 11 ounces weight could be concealed more easily than one of 16 inches and 17 ounces. The adjuncts can be added without bustle or noise.

The teachers from whom I derived my early maxims in obstetrics rather discouraged the frequent use of forceps, and with some reason, when we consider the kinds of instruments that were in use thirty years age, also most of those in use now. But I think if this instrument were in the hands of every practitioner, they would overcome their timidity of using forceps, and a vast amount of suffering would be spared. The instrument itself has no injurious property; the only conditions necessary to make its use entirely safe are, that there shall be sufficient relaxation, and that the head shall properly present.

The blades and shanks being so nearly of the exact curvature of the pelvis, and this curve extending clean to the joint, there can be no uncertainty as to the direction for traction; all one has to do is to move the blades in the line of their own curvature, and it is the same whether the instrument is used long or short, when the adjunct handles are used, they antagonize the upward curve of the blades so exactly that full tractile force can be exerted in the exact line of motion.

The construction of the shanks, joint, and handles differs from other instruments in this: that the shanks and handles are about 5/32 of an inch apart, and touch each other nowhere except in the socket and at the end of the handles, thus, pinching is impossible. The joint has all the facility for junction and disjunction of the English joint and all the security of the German or French. I have used the instrument nearly two years, both at lower and upper strait, and find it to answer fully my expectations. It will rarely be necessary to change the position of the patient in bed from the dorsal. The

highest point of tips rises $3\frac{1}{2}$ inches above axis of handles. (See figs. 540-547).

The points of advantage claimed for this forceps over all others, leaving all the old short forceps out of the question, are

1st. More easy of introduction and application to the head by reason of improved pelvic curve. The shape of the blades, and the absence of long and heavy handles.

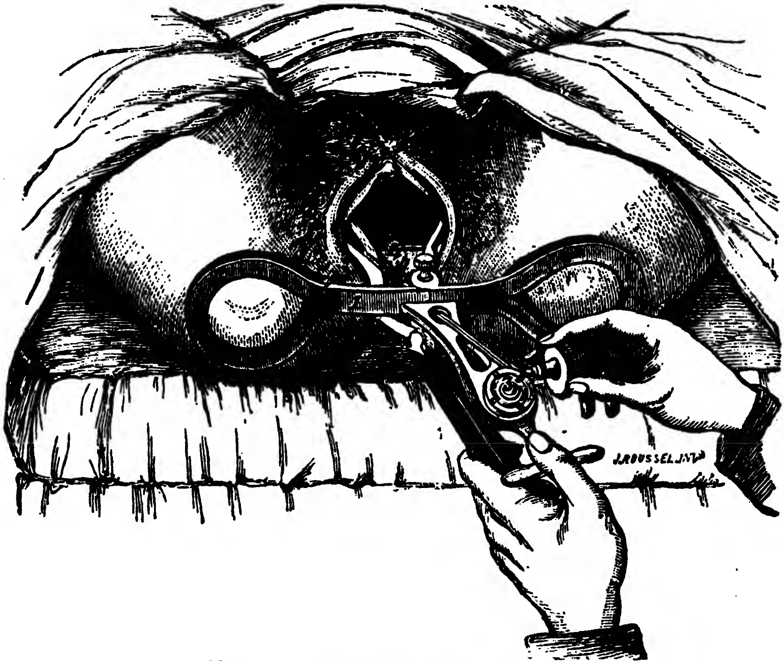


FIG. 548.—Roussel's Forcep-tractor.
(S. Maw Son and Thompson).

2nd. Facility for making traction direct in line of motion.

3rd. Facility for rotation by reason of downward curve.

4th. Entire exemption from pinching, either by joint or shanks.

5th. The proper length of anterior portion of blades; and the perfection of pelvic curve extending from joint to tips and absence of unnecessary width or thickness of any part of blades; rendering it less liable to do harm.

6th. Less frightful or momentous in appearance; the short form being the only one brought to view of patient or attendants. (It is necessary to conserve the equanimity of attendants as of patients).

7th. More conveniently portable.

8th. Facility of joint for locking, unlocking, and security.

9th. The shortness and lightness of the handles (in the short form, which is always used in introduction) give a finer sense of touch and direction of blades.

1874(?) Roussel.

Dr. Roussel of Geneve devised a mechanism for assisting traction with forceps. (See fig. 548).

1874(?) Taylor.

Dr. W. H. Taylor's "Lever forceps"—an instrument for applying traction to the end of the midwifery forceps is mentioned in New Sydenham Society's Lexicon of medicine. "It consists of a block of wood to the centre of which is hinged by a ball-and-socket joint, a metallic rod to which is attached a leatheren strap fastened to the end of the forceps; the wooden block rests on the bed and is fastened by a strap to the bed-foot." This description corresponds very closely to the figure given in Witkewski's L'arsenal obstetrical Fig. 641 and in Poullet's thesis, fig. 45 representing tractor of Pros of Rochelle.

1874(?) Clay.

Charles Clay was born on December 27th, 1801. When his school days were over he was apprenticed to Mr. Kinder Wood of Manchester. While with Mr. Wood he read much, attended more than five hundred cases of labour and assisted his teacher by making diagrams and dissections for his midwifery lectures. When his apprenticeship was over he was sent to the University of Edinburgh. He became qualified to practise in 1823. In the same year he started in general practice in Ashton-under-Lyne. He remained there for 16

years. In 1839 he removed to Manchester, and in 1842 performed his first ovariotomy. Although not the first to perform ovariotomy he was yet the first person who operated on a large series of cases. To him therefore, the epithet of the "Father of Ovariotomy" in Europe rightly belongs. He was also one of the first to perform hysterectomy and first in the British Empire to perform it successfully. Clay contributed copiously to the medical Journals and wrote a small "Handbook of Obstetric Surgery." On the title-page of this book he is described as "Late Senior Surgeon and Lecturer on Midwifery, St. Mary's Hospital, Manchester." It may be mentioned that Herman in his annual address before the Obstetrical Society in 1894 said:—"Clay had no hospital. All his operations were done in private." He died on September 19th, 1893.

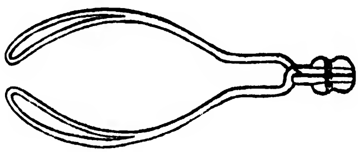


FIG. 549.
Clay's Forceps.
(Clay).

Dr. Clay's short forceps is intended to be convenient for the pocket. "The entire length of the forceps (including the handles) is only 10 inches, the handles being half the usual length, 2 inches. Along the curve of the blades $6\frac{1}{2}$ inches. Direct length of the blade 6 inches. Greatest width of the blade $1\frac{6}{10}$ inch. Between the points $\frac{3}{4}$ inch. Width of the blades when locked $2\frac{8}{10}$ inches. Length of the shank $2\frac{9}{10}$ inches. Between the shank when locked, for the finger to assist traction $\frac{3}{4}$ inch; shank and blades stronger and points approaching closer than Simpson's. The handles though only half the usual length, when wrapped in a napkin and the finger placed between the shanks, form a powerful instrument sufficient for most cases. The lock is so contrived that either blade can be introduced first and the shortness of the instrument

renders it easy of application, even should the patient be not advantageously placed."* (See fig. 549).

1874. Roller.

For a description of E. O. F. Roller's modification, see original reference. An illustration of Roller's forceps is given in Tiemann's Catalogue which is reproduced. (See fig. 550).

1874. Pros. (of La Rochelle).

He constructed a tractor the principle of which is the same as the tractor of Chassagny. Pròs, however, claims priority

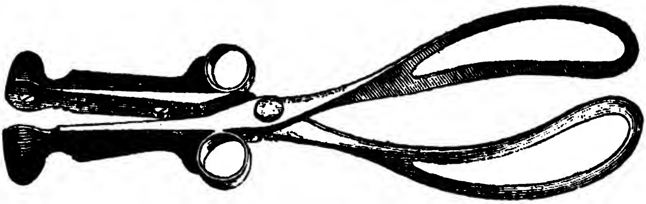


FIG. 550.
Roller's Forceps.
(Tiemann).

in a letter written in the *Bulletin de therapeutique* (22 May, 1877). A frame of wood covered with cloth placed under the buttocks of the patient, served as a resting point for the tractor. But the application of the force of traction at the centre of figure is not properly effected by the whole of the apparatus of traction of Pros. (See figs. 551-3).

The apparatus† consists of:

1. A movable shelf, to be placed on a bed or a table on which the woman lies, and allowing of different positions. It is 16x7.8x3.9 inches in dimensions.

2. Bracelets, not indispensable for holding the woman in place.

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*Clay's "Obstetric Surgery", 1874, p. 103.
†Cyclopedia. of Obs., p. 65.

3. A movable rod 21 to 26 inches long, articulating with the shelf. Extremely movable, it allows the accoucheur to make traction on the forceps with almost mathematical precision in the axis of the strait, even where the pelvis is oblique or oval. The attached handle has simply to be depressed in a half circle to exert a force of 28 to 31 pounds.

FIG. 551.
Pros' Tractor.
(Witkowski).

4. A slender forceps, 15.6 inches long, the fenestrae 1.36 inches deep the curve being like Levret's.

5. A traction bar and a dynamometer.

6. A rounded wooden canula for receiving the traction rods of the forceps.

7. A transverse rod to the forceps graduated in hundredth of an inch, to indicate the amount of separation of the blades.

8. An intra-pelvic traction rod to be used in case ot narrowing at the pelvic strait.

9. A belt to be applied around the waist of the woman to correct uterine obliquity, to control the uterus and to compress somewhat the foetus.

1874. Vedeler.

Vedelar of Norway described a new forceps. No description nor diagram is available.

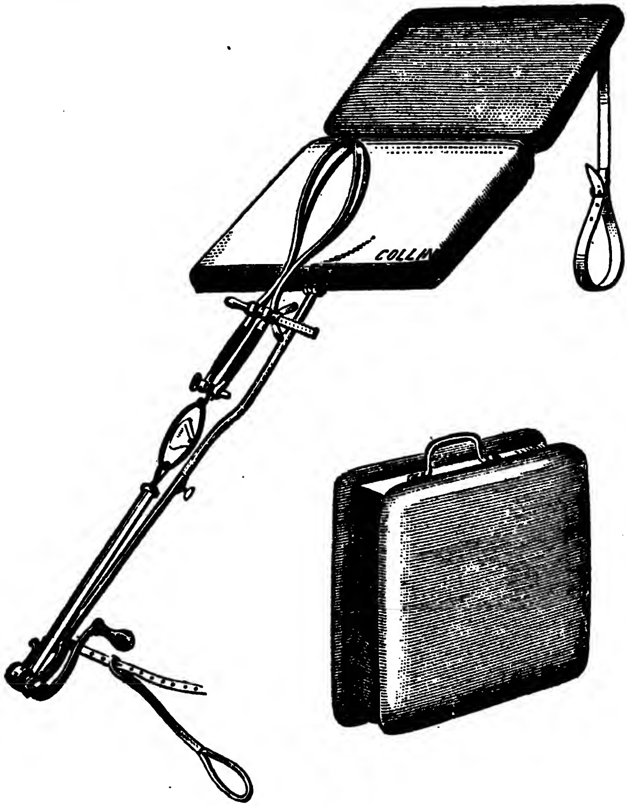


FIG. 552.
Pros' Tractor.
Showing parts of the instrument with dynamometric attachment.
(Witkowski).

FIG. 553.
Pros' Traction Apparatus.
Packed for portability.
(Witkowski).

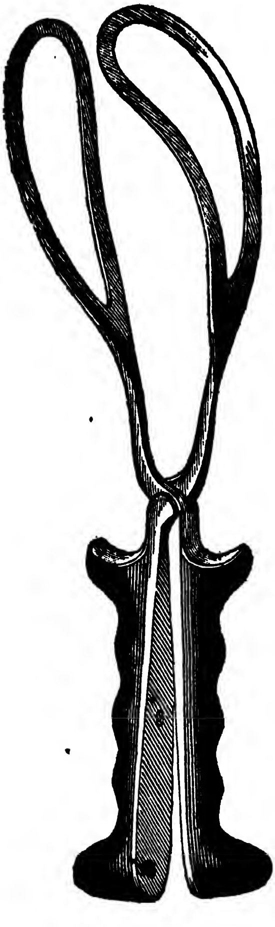


FIG. 554.
Budd's Forceps.
(Tiemann).

FIG. 555.
Leishman's Forceps.
(Complete).
(Leishman).

FIG. 556.
Leishman's Forceps.
(One blade, side view).
(Leishman).

1875(?) Budd.

Prof. Budd's forceps is referred to in Stuarts paper, in Amer. Jour. of Obs. 1877, Vol. x, p. 650. (See fig. 554).

1875(?) Burdick.

Burdick's forceps is mentioned in Tiemann's Catalogue. No illustration or description is available.

1875(?) Leishman.

William Leishman was born on June 8th, 1834, in the Manse at Govan. He was educated at the University of Glasgow where he graduated M.D. in 1855. He began to practise as a general practitioner in Glasgow but gave special attention to obstetrics and gynæcology. In 1868 he succeeded Dr. Pagan as Regius Professor of Midwifery in the University of Glasgow. He was consulting physician to the maternity hospital, Glasgow and Physician for Diseases of Women to the Glasgow Western Infirmary. He wrote two books which are his main contributions to obstetric science. He died from brain disease on February 18th, 1894.

In the construction of his long forceps, the first point borne in mind, was to ensure strength without clumsiness. "There is no necessity for the blades, if of proper material, to be of great thickness but the handles should always be large, of sufficient size indeed to be firmly grasped by both hands." The instrument is somewhat similar to Simpson's forceps. "The joints are made so loose as to admit of very slight lateral motion or overlapping and below the lock there are transverse rests which give more power to the hands." The length of the instrument is 16½ inches being 10½ inches from the lock to the tip of the blades and 6 inches for the handles. The measurements between the blades are the same as those of a medium-sized instrument and the fenestræ about 5½ inches in length. The instrument is thus both longer and of greater strength than those which are generally employed by English practitioners. (See figs. 555-56).

1875(?) Wilson.

In a catalogue of surgical instruments published by Lynch & Co., about 1893, mention is made of "Wilson's forceps" (No. 835A.). No diagram or description is given. As no christian name is given, it has been difficult for me to allocate the credit to the constructor. On enquiry, it has been found that the only "Wilson" who obtained any distinction in midwifery about that time was James George Wilson, the son of a distinguished accoucheur of great experience and fame, who practised in Glasgow. James George was born and bred in an obstetrical atmosphere and grew into nothing else than an obstetrician. In 1863 he was elected to the chair of Midwifery in Anderson's College. In 1875 he became a consulting physician to the Glasgow Maternity Hospital. He had overflowing enthusiasm in the study of midwifery as a science and as an art, but his contributions to medical literature were all of the kind called practical. He was elected Vice-President of the Obstetrical Society of London in 1865. He died in 1881.

1875. Smith.

Albert Holmes Smith was born in Philadelphia, July 19, 1835. He received his medical degree in 1856, and was appointed assistant physician to the 'Nurse's Home and Lying-in Charity' in 1859. In 1862, a re-organization was effected and he was appointed attending physician and lecturer, which was ably filled by him for more than 20 years. In the same year he was appointed one of the consulting obstetricians to the Philadelphia Hospital. He was one of the founders of the American Gynæcological Society and its President in 1884. He invented useful obstetric and gynæcological instruments and his modification of Hodge's pessary made his name widely known. In 1882, disease of the prostate set in and the question came as to its malignancy. On the advice of his professional friends he went in November, 1883 to London to consult Sir Henry Thompson who did not think the disease to be malignant but possibly might become so. He returned home and

resumed active practice but gradually his sufferings increased until finally he was almost constantly confined to bed for nearly a year when death on December 14, 1885 brought relief from terrible and trying pain.

Smith's forceps is thus described in Mann and Hirst's system of obstetrics and gynæcology. It "is a modification of

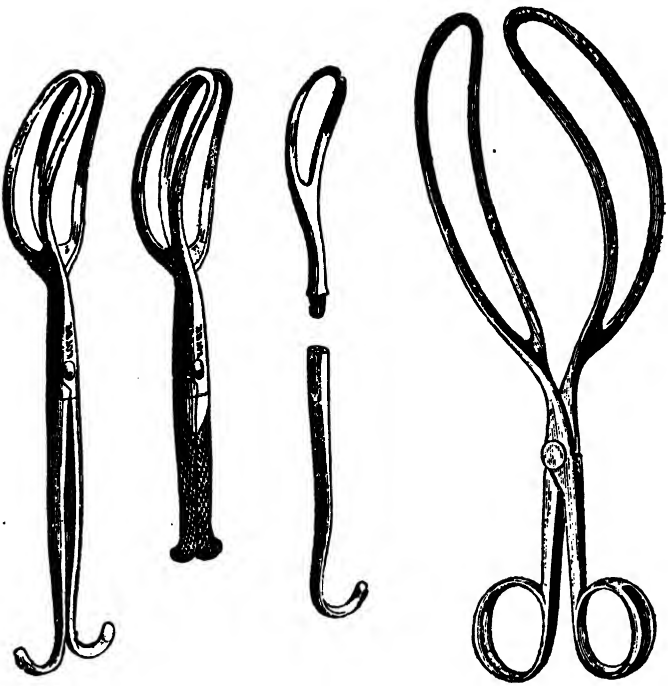


FIG. 557. FIG. 558. FIG. 559.
Smith's Forceps.
(Mann and Hirst's Obstetrics).

FIG. 560.
Newman's Forceps.
(Tiemann).

the Davis forceps, made more easily portable by a pivot and ratchet in each handle permitting them to be taken apart. Two sets of handles are provided, longer and shorter, for use as compression may or may not be required." (See figs. 557-59).

1875. Newman.

W. H. Newman described a new forceps. (See fig. 560).

FIG. 561.
Taylor's Forceps.
(Witkowski).

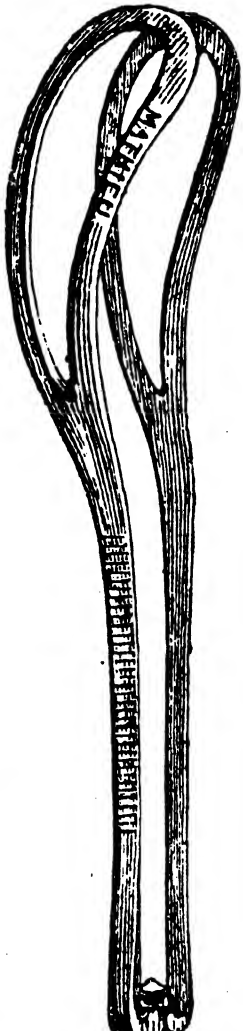


FIG. 562.
Trelat's Forceps.
(Witkowski).

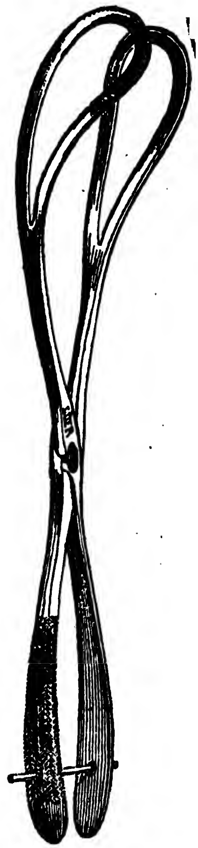


FIG. 563.
Trelat's Forceps.
(Poullet).

1875. Taylor.

Isaac Ebenezer Taylor was born April 25, 1812. He took his M.A. and M.D. at the University of Pennsylvania, settling down to practise in New York in 1839. In 1840 he visited Paris and Dublin. He was physician to the Bellevue Hospital. He contributed liberally to medical literature. On October 30, 1889 he died in New York.

His narrow-bladed forceps, was devised for introduction within a cervix not more than 1½ inches in diameter. Moreover, when the head is so high up and so oblique that it is impossible to carry on blade of the forceps as high as the other, the instrument may be locked temporarily by making use of additional holes on the female blade for the insertion of the pivot. When the os is sufficiently dilated and head brought down, the blades may be readjusted and the pivot placed in the middle line. (See fig. 561).

1875(?). Trelat.

Professor Trelat has had a parallel or non-crossed forceps constructed for application at the vulva. This is a small light forceps, of great elasticity and flexibility which the makers vulgarly name "Sugar pincers." It can be worked by rotation of the branches like the large forceps of Bernard (of Apt). (See fig. 562).

Professor Trelat constructed his forceps after a series of experiments by modifying the thickness of the metal at certain points of the instrument and by varying the quality of the steel. The following description is quoted by Poullet from Dr. Bureau who used this instrument very largely. "Professor Trelat had two models of his elastic forceps constructed by Lüer, the one has remained in the obstetric museum of Cochin, the other one, which Trelat had kept, has been sold by him to a practitioner in Geneva, Dr. Odier."

"The Lüer model is less massive and heavy than the ordinary forceps. Its length is 41 cm. and the greatest width of its blades, is 47 mm. The blades are rounded, elastic and polished on their concave and convex surfaces; the handles

have no hooks ; the articulation is that of Brunninghausen with lateral pivot and mortise. Near the extremity of the handles there is a hole in which a stem of steel can be introduced which acts as a resting point to the hands during extraction." (See fig. 563).

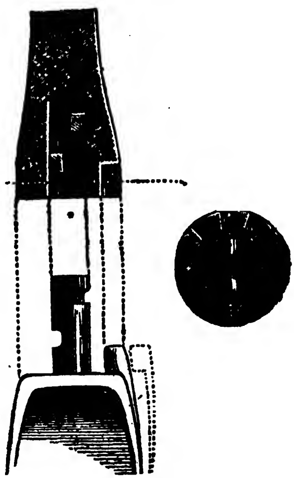


FIG. 564.

Roger's Forceps. (Witkowski).

FIG. 565.

Longitudinal and transverse section of the bayonetted joint in the handle of Roger's Forceps. (Witkowski).

A model of Trelat's forceps was exhibited by Lüer at the Obstetrical Society's Conversazione the measurements of which will be found in the appendix.

1875. Roger.

Roger of Havre described an asymmetric forceps, the two blades of which are mounted by a bayonetted joint on the handles. The blades have a certain amount of rotary movement outwards and thus open a little in front, the oval which receives the head. These branches can also articulate at unequal height, for the pivot can be screwed on, in three openings 1 cm. apart. (See figs. 564-65).

1875. Laroyenne.

The principle formulated by Chassagny that "the force of extraction must be applied at the centre of figure," led Laroyenne to modify the forceps by providing a hole in each rim of the fenestræ of the blade, for the introduction of a cord, preferably a ribbon. Traction can be made by drawing on the distal ends of these ribbons, tied together.

According to Laroyenne, the ribbon-method suggested by Chassagny, or traction in the centre of the figure gave Tarnier the idea of modifying his forceps.

Laroyenne made use of his modified forceps during his service at la "Charite" of Lyons:—

The following description of Laroyenne's method of traction is quoted from his article. "I have brought to the forceps an improvement insignificant in appearance but which is sufficient to completely realise the fundamental principle of Chassagny's apparatus—principle in virtue of which force must be applied at the centre of figure of the body that one wishes to draw through a curved channel like that of the pelvis. It consists in having the anterior and the posterior borders of each blade pierced by an aperture corresponding to the centre of the head gripped by the forceps. Any forceps possessed by the practitioner can easily bear the drilling of its borders and it is not necessary to obtain a new instrument—a consideration which is not to be disregarded if one desires that the use of traction by small ribbands passed in the new hole of the blades should spread rapidly amongst practitioners and be accepted by them in substitution of those in daily practice.

Each branch, therefore, carries, before its introduction, a separate cord, preferably a strong linen ribband which traverses easily the two openings in question from inside out that is to say from the concavity towards convexity. The forceps being introduced, the ends of these ribbands, after having run along the convex surfaces, are knotted together and form a handle in contact with the perineal commisure, behind the handles of the instrument. (See fig. 566).

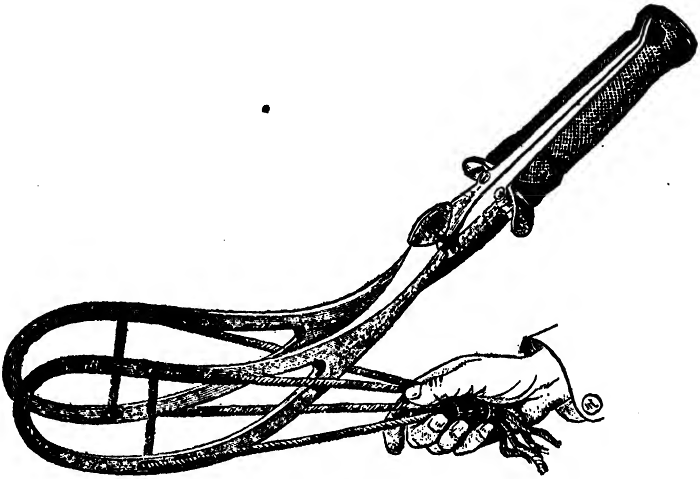


FIG. 566.
Laroyenne's Forceps.
(Witkowski).

This handle is confided to an assistant, or even to two if necessary, who play the part of a machine and consequently the selection of which is more or less different.

He sits on the ground or on a stool and works the traction ribbands in the direction which is indicated to him as favourable to the descent of the head and which is made to vary according to its progress or the obstacles which it meets with. The obstetrician, standing, holds the handles with the whole hand."

Poullet in presenting to the Surgical Society on 7th April, 1875, a method of forceps traction by ribbands passed through

two perforations on the posterior rims of the fenestræ, stated that this idea belongs neither to Laroyenne nor to him, as he found the following passage in Hamon's treatise on the Retroceps (1873).

"Fix, like Chassagny, a cross bar at the centre of the fenestrum, take, if you prefer it, a *point d' appui,* in that place by means of a little opening made in each blade and fasten there the bands by means of which you effect your tractions."

SECTION VII.

NINETEENTH CENTURY.

(FOURTH QUARTER)

1876(?) Cole.

Richard Beverley Cole was born in 1829 in Manchester, Virginia. He graduated at Jefferson Medical College before he reached his twentieth year, and started practice in Philadelphia soon after. About that time the new gold fields of California began to attract the world's attention and in 1851 young Cole went to San Francisco, opened an office there and quickly acquired a prominent place in both medical and

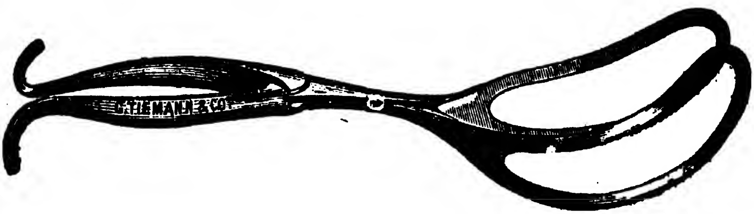


FIG. 567.
Cole's Forceps.
(Tiemann).

civic circles. In 1858 he became professor of obstetrics and gynecology in the University of the Pacific. In 1866 he accepted the same chair in the faculty of Toland Medical College retaining it until his death. Throughout this long sequence of years as a teacher of obstetrics Dr. Cole maintained a position in the front rank. He was an M. R. C. S. England, and a fellow both of Obstetrical Society of London and the British Gynæcological Society, also president of the American Medical Association 1895. He succumbed to arterio-sclerosis on January 17, 1901.

Cole modified the Obstetric Forceps. (See fig. 567).

1876(?) Olshausen.

This is a forceps with solid blades and English lock. (See fig. 568).

1876. Draper.

Draper described his folding forceps in which one blade folds within the other so that both may be introduced at the same time. The instrument is a modification of Vacher's forceps. When open, the handle, which is made of ebony, fits the palm of the hand and the fingers perfectly and a good firm grasp of it may be obtained. The proximal end of the hingebolt, which connects the neck of the forceps, is bent at right angles and being let into one side of the handle, it is quite concealed. Yet if it be necessary to separate the blades during an operation, this separation can be quickly effected by a very simple movement. There is a spring lever in connection with the catch which locks the two parts of the handle together. The lever is enclosed within a thumb depression at one extremity of the handle and is quite out of the way, yet by placing the tip of the thumb in the depression, the spring readily acts. The blades are made as light as possible, consistent with a moderate degree of strength. The forceps weigh only 8 ounces. The instrument is electro-plated and may be conveniently carried in the breast pocket.

The forceps being folded, the two blades are simultaneously introduced exactly in the same way that one blade of the ordinary short forceps is introduced; this having been, one-half of the cross handle is held *in situ* while the other half is gently separated from it the result of which is that the small hinge-joint connecting the shanks, of the blades together is acted upon, one blade glides from under the other, over the fœtal head and with a little management, this revolving blade is easily got into position opposite to the fixed blade: the two halves of the handle now come into apposition when by means of the spring catch, they are firmly locked together and form the cross handle. (See figs. 569-70).

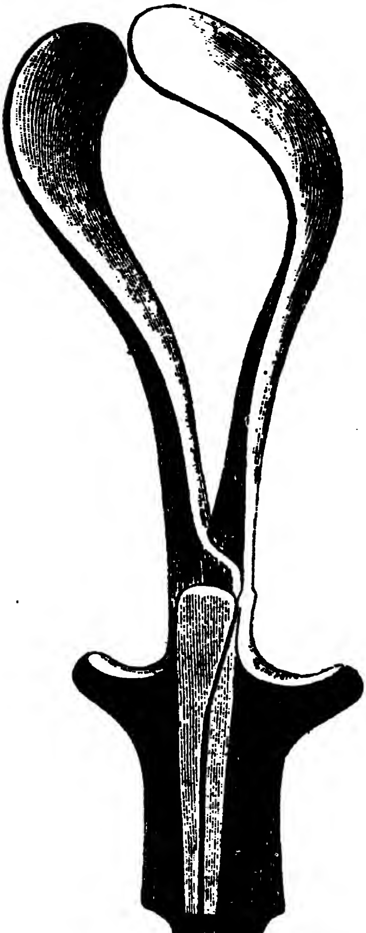


FIG. 568.
Olshausen's Forceps.
(Jetter and Scheerer).

If it be desired to take off the forceps, it is necessary simply to withdraw the hinge-bolt when the two blades are at once separated and set at liberty.

The forceps may be used if it be deemed desirable, under the bed clothes without the knowledge of the patient or her attendants.

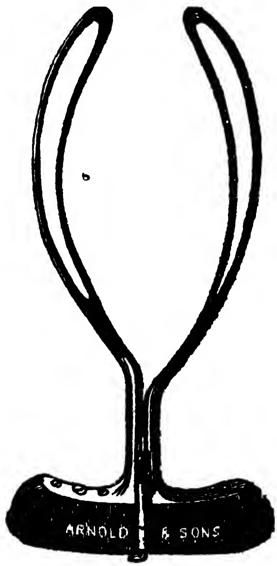


FIG. 569.
Draper's Forceps folded.
(Arnold and Sons).

FIG. 570.
Draper's Forceps.
(Arnold and Sons).

1876. Young.

Young read a paper* on a new and improved form of Vacher's Forceps, "the principal feature being the elongation of the stem, giving more space in the adaptation of the blades over the foetal head, the shaft being four inches and a half in length while in the forceps of Dr. Vacher, the shaft is only one inch and a half."

*Transac. Edin. Obs. Soc. Vol. iv. p. 253.

1876. Sawyer.

For a description of E. W. Sawyer's forceps, see reference. (See figs. 571-3). A further communication was made by Sawyer in 1885 on "the continued pelvic curve in the obstetric forceps." (See ref.).

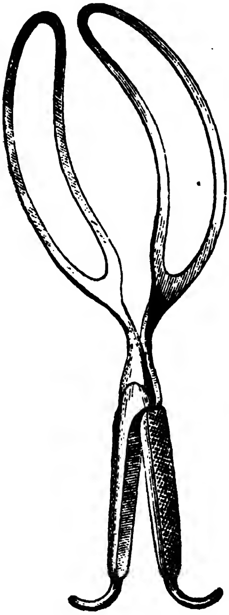


FIG. 571
Sawyer's Forceps.
(Tiemann).

FIG. 572.
Sawyer's Forceps.
Left blade, side view.
(Tiemann).

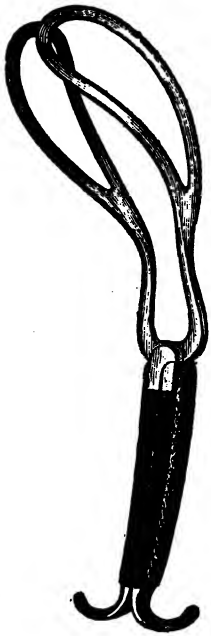


FIG. 573.
Sawyer's Forceps.
(Tiemann).

1876(?) Brickell.

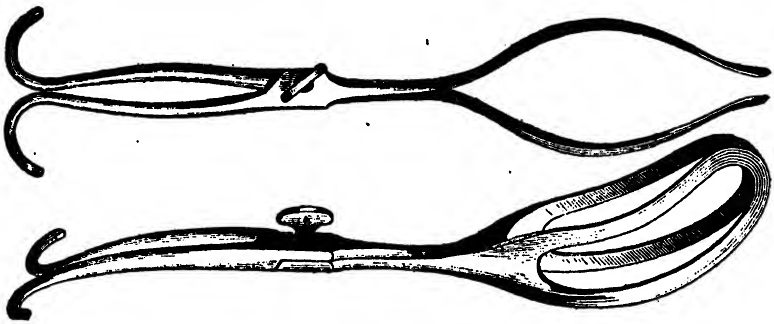
Daniel Warren Brickell was born in Columbia, South Carolina in October, 1824. He received his diploma in medicine at the University of Pennsylvania in 1847. He made a special study of gynecology. He became clinical teacher of the diseases of females and lecturer of obstetrics in Bellevue. He organised the New Orleans School of Medicine. In 1873

Bellevue tendered him the chair of obstetrics. He died in December, 1881.

His forceps is illustrated in Tiemann's catalogue. (See figs. 574-5).

1877. Hubert (Junior).

Inspired by his father's ideas E. Hubert (Junior) invented a forceps, the branches of which did not cross and the blades were approximated by a kind of joint. It may be said that they contained a little of the idea of Mattei's Leniceps. The



Figs. 574-5.
Brickell's Forceps.
(Tiemann).

following description of the instrument is given by the author himself:—

(1) I have preserved to the forceps the shape of S which my father had given to it, because it has been well proved that to draw exactly in the axis of the superior strait, without waste of force and without useless compression, this shape is indispensable.

(2) The handles not being able ever to give a point of attachment to the traction, on this side of entablement, I have suppressed them from this point as useless or dangerous.

(3) Admitting, as proved, that parallel branches are preferable to crossed branches because they adapt themselves better to the head and because they compress the head less during traction, as they act more through the blades, than by

their tips, thereby reducing the head in a more useful manner, as in the instruments of Palfyn, Mattei and Chassagny, I have given up crossing, which transforms the branches into real tongs.

The blades of my parallel branches form with their shanks the same angle of 120°, anteriorly as the axis of the superior strait forms on the axis of the inferior one; their pelvic curve,

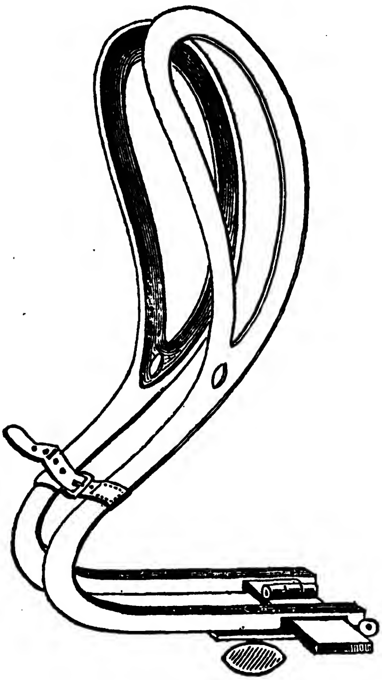


FIG. 576.

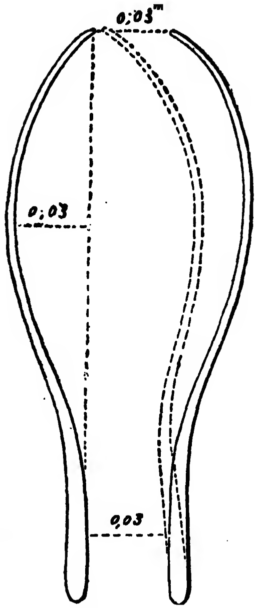


FIG. 577.

Hubert's Forceps.
(Poullet).

identical to that of the pelvis, is therefore more correct than that of the common forceps.

Their cephalic curve is that of the fœtal cranium to which they should adapt themselves (3 cm. deep and 15 cm. long.). When they are properly applied on an ordinary head, the tips like the shanks are at a distance of 3 cm.

Immediately below each fenestrum, I have had a hole bored, with rounded edges for the passage of the cord of the apparatus, for continuous traction.

At 10 cm. from the blades, the shanks. already slightly curved in, curve themselves abruptly backwards, and form strong laminæ, 13 cm. long and at right angles to the direction of the axis of the blades.

Mode of articulation:—The shank of the right branch presents at its extremity and on the inferior surface a transverse bar which is received into a notch in the other branch, and which a screwed pivot allows of tightening firmly.

The transverse bar, which serves as a connecting link is 7 cm. long and allows of articulation at different degrees of separation of the blades. This bar is provided with a hinge which allows the blades to be inclined towards each other. The result is when the shanks are articulated for example 3 cm. apart, the tips of the blades can be forced to touch each other by means of a ribband or strap, applied on the straight portion of the shanks, thus reducing the separation of the blades from 9 to 7 cm. (See figs. 576-7).

1877. Tarnier.

Etienne Stephane Tarnier was born at Aiserey, a village near Dijon on April 29th, 1828. At the age of 20, he proceeded to Paris to study medicine. In 1856 he entered the Maternite Hospital as an *interne*. At that time the mortality from puerperal fever in the Paris hospitals was frightful. Tarnier soon became convinced that puerperal fever was spread by contagion. It was necessary, however, that he should prove it. He formulated his views in his inaugural thesis; meanwhile his tenure of office at the hospital came to an end and he had to decide how he was to earn a living. He determined to remain in Paris. Taking rooms in a house in the Rue de Rivoli, he became physician to the Bureau de Bienfaisance and endeavoured to make a livelihood without drawing upon the meagre resources of his parents. He met with so little success that he was on the point of relinquishing a medical career when

FIG. 578.
S. Tarnier.
(1828—1897).
(Gyn. Transac XXIII.).

an event occurred which changed the aspect of affairs. A discussion on the nature of puerperal fever took place at the Academie de Medicine which extended over four months of the year, 1858. The thesis of Tarnier was constantly quoted. Dubois became interested and promised Tarnier that he would instal him as *chef de clinique ;* whereupon Tarnier set to work with renewed ardour and wrote a fresh monograph on puerperal fever which was published in 1858. As promised, Dubois appointed Tarnier *chef de clinique* in 1861. Tarnier succeeded Trelat as chief surgeon and director of the Maternite of Paris in 1867 and continued to hold this position for 22 years.

In addition to this great work of slaying the dragon of puerperal infection, he found the time and energy to invent or modify various obstetric instruments and methods of treatment. "Tarnier's Axis Traction Forceps" is truly a landmark in the history and evolution of obstetric forceps.

When in 1889 Tarnier left Maternite to succeed Pajot at the clinique des accouchements his activities by no means ceased. In his capacity as professor, his manner was restrained calm and dignified. He treated the work of others with respect and if he had occasion to differ from them in opinion, he expressed himself without acrimony and in terms of studied moderation. Tarnier had many honours showered upon him.

He was engaged upto the last in seeing through the press, the third volume of his monumental 'Traite de l'art des accouchements.' He died after a short illness on 23rd November, 1897.

Tarnier, presented to the Academy of Medicine, a new forceps, suggested by that of Morale, but modified considerably, to fulfill the three following desiderata: (1) constant and easy traction along the axis of the pelvic planes; (2) freedom of movements of the head as in natural labours and (3) provision of an indicator needle which will indicate all the time, if the operator is really following the desired direction of traction.

Chereau observes that this instrument offers the following advantages.

(1) It is always possible to apply traction in the axis of the pelvis

(2) If the operator fails to draw in the axis of the pelvis and he directs his force, either too much or too little the pressure exercised by the head of the fœtus or by the blades of the instrument on the soft parts lining the wall of a small pelvis, is relatively harmless, as the tractile force acts through a very short lever, while in the case of an ordinary forceps, one works with a lever of considerable size, of which the action is dangerous for the integrity of the soft parts.

(3) With the new forceps, the head of the fœtus follows the antero-posterior curve of the pelvis, with a degree of freedom which is not possible with the ordinary forceps.

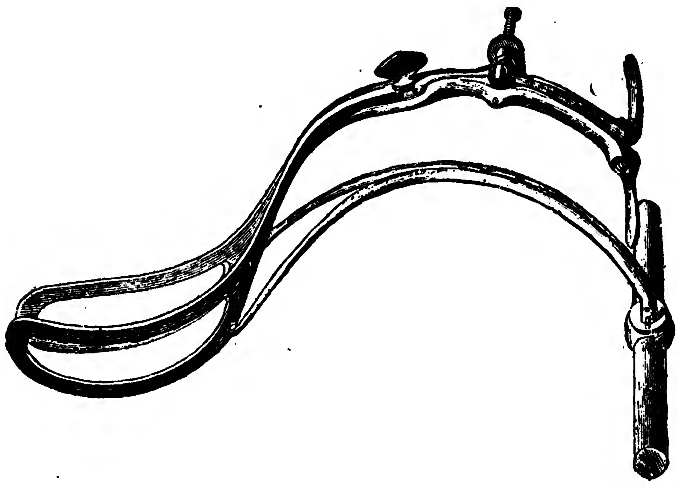


FIG. 579.
Tarnier's Forceps.
(1877 Model).
(Tarnier).

(4) The indicator needle, fixed to the so-called handle, shows absolutely correctly the direction of traction.

(5) Constant pressure is exercised on the fœtal head by means of a screw. This pressure is much less prejudical than that produced by an ordinary forceps.

(6) Due to the mobility of the handle which turns in all direction, the fœtal head is free to turn round in the imaginary axis of the pelvic cavity.

Chereau concludes his article on forceps by saying, that as the result of his patient researches and study of the subject, he is imbued with only one sentiment, *viz.*, that of respect mixed with admiration, although some people inclined to mockery and malice may laugh at such multiplicity of experimental designs of the forceps.

Tarnier's forceps (1877 model) consits of two prehensile branches and two traction-rods. These latter are fixed on to a transverse handle. Each of the prehension branches and traction-rods present an articulating part. The branches of prehension meet the traction-rods by an articulation which is movable in every sense. It will be noticed that the branches of prehension cross each other and articulate as in ordinary forceps, while the traction-rods are parallel as in the forceps of Thenance.

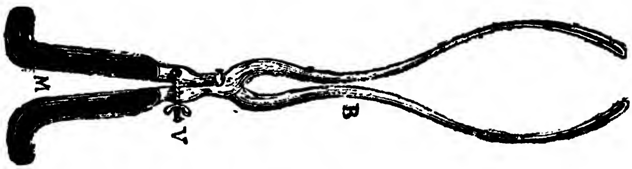


Fig. 580.
Tarnier's Modified Forceps.
Front view.
Branches of prehension and rods of traction.
(Chereau).

Fig. 581.
Transverse Handle of Tarnier's Modified Forceps.
(The handle is mobile in every sense).
(Chereau).

The fig. 579 represents the forceps $\frac{3}{4}$ view, but the branches of prehension have been separated from the traction-rods, to give a clear view of them, respectively.

During the course of next 4 or 5 years Tarnier made several successive modifications of his original instrument. The second modified forceps is composed of two branches, which cross as the ordinary forceps. To this an independent piece is added the transverse handle which is movable in all directions (See figs. 580-1).

Each half of the forceps properly so called is composed of a branch of prehension and a traction-rod. Each traction-rod comes out laterally and terminates in a small bolt and is maintained fixed to the corresponding branch of prehension and remains fixed until the operator releases it. (See fig. 582).

FIG. 582.
Tarnier's Modified Forceps.
Profile view.
The transverse handle is articulated with the rods of traction.
(Chereau).

To summarise, Tarnier's forceps is composed of (1) Two branches of prehension, crossed as in the ordinary forceps the blades however are kept applied to the head continuously by means of a screw attached to the extremity of the handles; (2) tranction-rods which are united by a transverse handle and which act as parallel branches and can in no way, increase the compression.

The principal dimensions of the instrument are:

Total length 42 cm.

Length	from extremity of handle to articulation ...	15 cm.
,,	from articulation to extremity of blades ...	27
,,	of curved portion of blades along the edges ...	20.5
,,	of portion parallel from articulation to beginning of curvature of blades ...	6.5

The model of forceps which Tarnier has recommended in his memoir of 1877, possesses at present only a historical interest, having since undergone a real transformation. A detailed description is not necessary as fig. 579 gives a fairly accurate idea of the instrument. It had then a perineal curve of the whole instrument and its wooden handle was not movable around the longitudinal axis of the blades. The blades themselves were of smaller dimensions and a special abrupt curvature. The instrument had also, what Tarnier named, the *needle*, for indicating, the proper direction of traction.

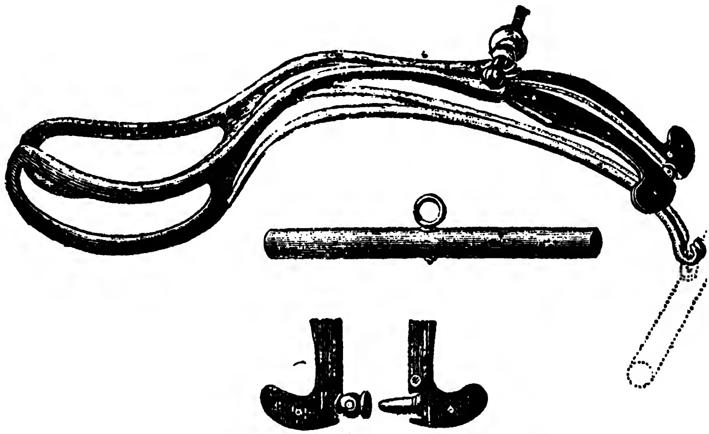


FIG. 583.
Tarnier's Forceps.
With parallel branches.
(Witkowski).

The following are the peculiarities of the first model *i.e.* that of 1877 as described by Aubenas. "It is composed of two handles and of two traction-rods. The rods are inserted into a transverse bar at p and are parallel as in the forceps of Thenance. The fenestræ are not as long as in the classic forceps; the instrument has a perineal curve, that of Morales modified; the traction-rods and the handles are united by a freely movable articulation. To apply this forceps: Articulate each traction rod to its corresponding blade and this is easily done. Holding both in the hand, the blade is applied to the head in the usual fashion. When both blades have been

introduced, the forceps is locked with the traction-rods below, compression is applied to the head by means of a screw working from one handle to the other. The traction rods are inserted into the transverse traction bar. During traction on this bar, the handles act as an index of the direction in which traction should be made and the operator has only to follow the oscillations of these handles keeping the traction-rods about one-half an inch apart from the handles."

The model of Tarnier's forceps which was presented to the Congress of London in 1881, is 42 cm. long and when

FIG. 584.
Tarnier's Forceps.
With mobile handles.
The handles are fixed transversely so that they may be easily and firmly seized by the hands.
(Tarnier).

placed flat on a horizontal plane, the tips of the blades lie 8 cm. above this plane. The blades and the curves are exactly like those of the ordinary forceps with the only difference that the fenestra are a little less in length. The distance from the extremity of the blades to the pivot is 27 cm. and that from the extremity of the blades to the extremity of the rods of traction is 25 cm. When the instrument is articulated the tips of the blades lie 2 cm. apart. The greatest distance between the blades is 7 cm. as in classical forceps.

The movable handle articulates with the traction-rods by means of a sliding lock. The handles of prehension are covered with a plate of horn. The traction rods are fixed to the branches of prehension by a mobile articulation, which make a sort of lateral spring, and coming and hitting against a small peg, are retained there. They become united to the corresponding branch of prehension and can be separated when desired by the obstetrician.

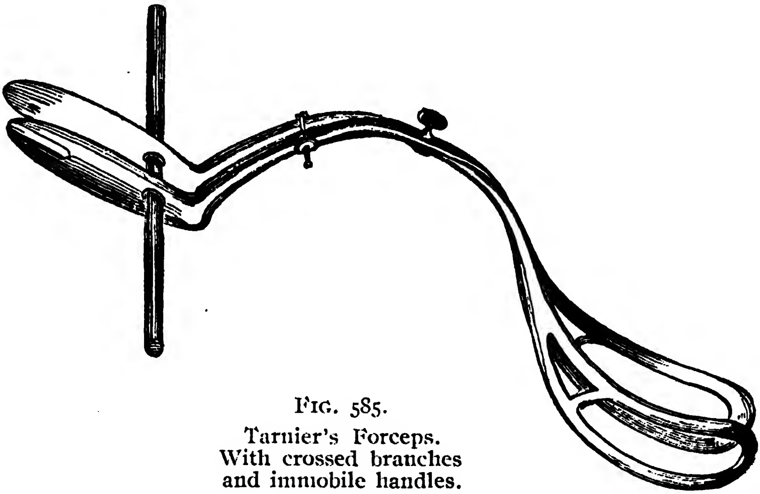


FIG. 585.
Tarnier's Forceps.
With crossed branches and immobile handles.
A transverse bar traverses the handles, and is used for traction. A screw insures apposition of the branches and fixation of the blades on the foetal head.
(Tarnier).

Once the branches are introduced and articulated, the grip of the head is assured by the help of a screw going from one branch of prehension to the other. The traction rods are disengaged by the finger in making them pass over the peg. They are then attached to the handle of traction by the help of a sliding lock. Traction is made by the transverse handle, keeping the traction rods always at 1 cm. from the shanks of the forceps.

The following description of Tarnier's Axis-Traction Forceps is reproduced from Doran's Descriptive Catalogue. (56 B.).

Length of traction-rods to joint of traction handle not measured by curve, 11 in. (28 cm.) ; length of traction handle $9\frac{5}{8}$ in. (24.4 cm.).

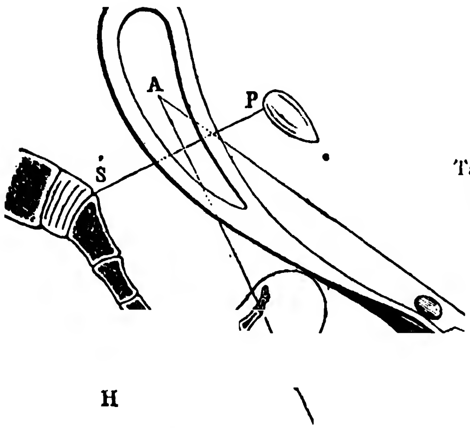
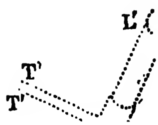


FIG. 586.
Tarnier's Traction Rod and and Tractor adjusted on an ordinary forceps.
(Witkowski).

A. B. Axis of pelvis.
A. F. Direction of Traction made on the handles of the instrument.
C. Traction Rod.
D. Articulation of the tractor with the traction rod.
OO. Pointers in connection with the traction-rod to show the proper direction of the axis of the pelvis:—
L. Handle of tractor.
L'. Handle of tractor in another position.
T. Stem of tractor when traction is made in the axis of the pelvis.
T'. Stem of tractor away from pointers when traction is in a wrong direction.



Blades very stout and rounded, moderate cephalic and pelvic curve, French forceps-lock. The shanks flattened antero-posteriorly are bowed outwards from the lock and then turn inwards so that they touch when the blades are closed

to their greatest extent, when the usual or "application" handles lie apart at their far ends to the extent of over an inch; at the same time an oval gap between the shanks allows of the introduction of the operator's finger. The metal of each limb runs for the whole length of the "application" handles and is coated before and behind with smooth ebony. No finger-rests, free ends everted. The fixation screw swings upwards and downwards on a hinged pivot projecting from the anterior surface of the handle of the lower blade near the lock, it is made to pass into a gap in a ring on the opposite handle, being fixed by a travelling screw with wide wings. The traction-rods or stems each fit into a groove, cut in the metal of the blade, moving on a pivot; by this arrangement they are made level with the blades. They bear at their free ends a spring push over which a socket passes to keep them close together. This socket forms a hollow cylinder about ¾ in. (2 cm.) long, united to the middle of the traction-handle by a pin. Thus the handle, a cylindrical oaken bar, can rotate on the pin and together with the socket can rotate round the ends of the traction-rods, making a universal joint.

The essential feature of the axis-traction forceps is that it has traction-rods joined to the proximal end of the blades and curving backwards towards a transverse bar the "traction-handle" of the instrument. The attachment of the rods to the handles allows of Direct traction on the head in their embrace. The "perineal curve" or backward compensation curve of the rods allows of the traction by a curved instrument, through a curved canal without either loss of power or misdirection of force. The jointing of the rods allows the advancing head to move the "application handles" (the ordinary handles of obstetric forceps) in the constantly changing direction along which it is travelling; and the direction of the application handles thus furnishes the operator with an unerring index to the proper line of traction.

This instrument was made after the second (1877) pattern of Tarnier's forceps; when compared with the other type the handles were lighter, the shoulders smooth at the points of articulation of the traction stems with the blades and the

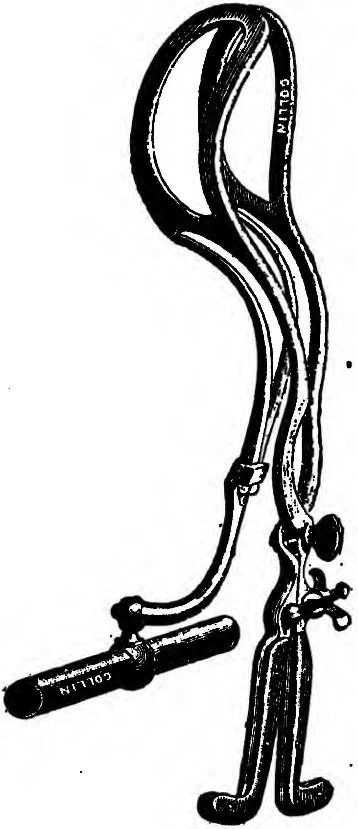


Fig. 587.
Tarnier's Forceps.
Model 1881.
(Collin).

Fig. 588.
Tarnier's Forceps.
With removable traction rods
placed inside the branches.
(Collin).

handles locked by a new and simple arrangement. (See "The New Forceps of S. Tarnier," B.M.J. 1877, i, 665; Obs. Transac. xix, 1877, p. 224, a letter from Prof. Tarnier to Dr. Alfred Wiltshire). In this sample, however, the shouldering of the traction rods is different, though it is seen as in Tarnier's original 1877 model in A. R. Simpson's forceps, 56 c. Besides, the universal joint is a later modification shown in Tarnier's 1881 pattern, where the traction rods are jointed (Arsenal Obst. fig. 615 and 617).

See following references.—Marchal, (E.) Naggioli, (V), Le Pileur, Kucher, Nordan (M), Rey (M), Paschetto (A), Sanger (M), Schoelhammer, Stoltz, Verrier (E), Warren (S. P.), Wasseige (A), Yarnall (M), Duse (A); Fasola (E.) Diehl (C), Esmann (V), Gibson (M), Lahs, Mann (M. D.), Murdoch-Cameron, Nagel (W), Nieberding (W), Newton (J. L.), Reith (A), Stadfelt, Treumann, Webb (V. G.), Williams (J. W.), Zangmeister (W.).

1877. Stuart.

Dr. Francis H. Stuart of Brooklyn devised a pair of forceps, which combine the "short" and "long" forceps in one pair after trial of a number of Professor Budd's forceps with a single modification, *viz.*, that the shanks of the blades are not quite ⅝th of an inch apart. But any other forceps can be made in the manner proposed. Budd's forceps are essentially Simpson's blades and Elliott's lock and handles. The blades never pinch the parts and the lock and handles, combine advantages that make these forceps deservedly popular. The short forceps are 12 inches long. The ratchet and catch at the end of the handles keep the forceps locked and in place. Sufficient traction-force can be used with these curved handles to terminate most labours after the head has 'engaged'.

When the 'long forceps' are required, the catch may be left down and used or it may be thrown back before the long handles are attached and then brought up beside the right handle, where it is entirely out of the way. After the

"short forceps" have been applied, the handles are easily adjusted. The thumb-screw (A) is to be loosened. Then the opening (D) in the long handle is put over the curved portion of the short handle. A small strong pin (B) on the inner surface of the opening in the long handle fits into a slot in the upper surface of the straight portion of the short handle. The distal end of the long handle has a counter-shank opening (F) for receiving the thumb-screw (A). The thumb-screw is now tightened and the forceps are ready for use. They are as *strong and efficient as any long forceps.* In length they measure 16½ inches. A screw (G) at the end of the handles adjusts the amount of compression.

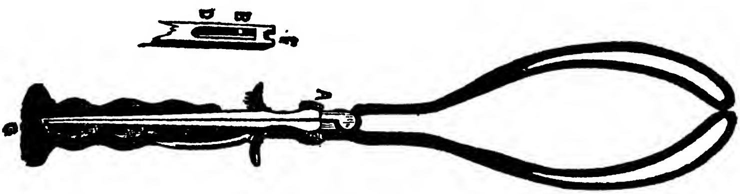


FIG. 589.
Stuarts' Forceps.
(Amer. Jour. of Obs. X.).

The advantages of these forceps, may in brief, be stated to be: (1) They are easily portable. (2) They combine both long and short forceps. (3) They are less expensive than two pairs of forceps and are *equally* serviceable. (4) They are more easily applied than ordinary long forceps. (5) They are simple in construction.

1877. Galabin.

Dr. Alfred Lewis Galabin was obstetric physician to Guy's Hospital. He qualified in medicine in 1872. He was the author of "A manual of Midwifery" and "The students' Guide to Diseases of Women." Both these were of very high order and went through several editions. He contributed liberally to medical literature. He was elected President of the Obstetrical Society of London and of the Hunterian Society

Dr. Galabin showed a pair of forceps, before the Obstetrical Society of London on 7th Nov. 1877, designed to allow the direction of traction to be precisely that of the axis of the pelvis where the centre of the head was situated.

The instrument shown was similar in principle to several of those mentioned by Dr. Aveling but differed from the English in the shape of the handles and from the foreign patterns in having an English lock.

Below the lock the shanks were curved backwards until they met the prolonged axis of the blades and then ended in straight handles coincident with that axis. The backward curve was more complete than in the forceps of Morales. The handles had flanges for the fingers of the left hand like those

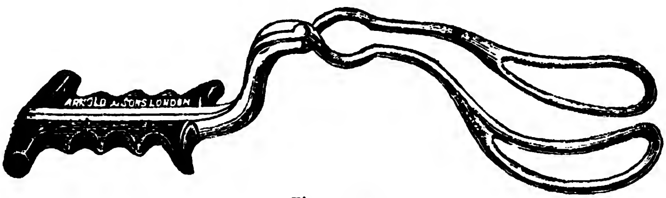


FIG. 590.
Galabin's Axis-traction Forceps.
(Arnold and Sons).

of Simpson's forceps. The transverse part of the shanks also afforded a very powerful hold, if necessary.

1877. Cleeman.

Dr. Richard A Cleeman of Philadelphia showed before the Philadelphia Obstetrical Society on December 6th, 1877 an obstetric forceps with a pelvic curve in the shank.

The dimensions of the forceps are those of the "Hodge forceps" except that the shank has been bent at an angle of 120° and there are no hooks at the end of the handles.

In using an instrument thus modified, the extracting force must of course be applied perpendicularly to the handles as nearly as possible, in the axis of the superior strait. After the head has entered sufficiently deeply into the pelvis, the forceps with the curved shank could be removed and an instrument of

the ordinary kind substituted that advantage might be taken of the greater mechanical power afforded by the straight shank of the latter.

Cleeman's instrument was devised simply to overcome the difficulties of high pelvic application: This is referred to in Hoffman's paper on axistraction forceps in the transactions of A.A. of O. & G., Vol. III. 1891, p. 57.

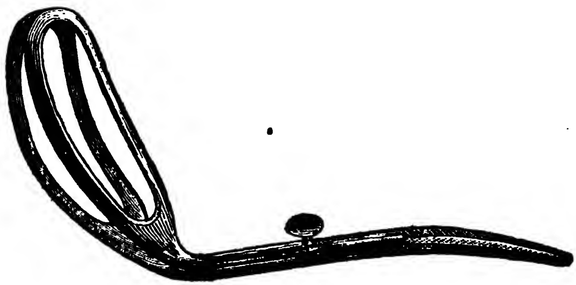


FIG. 591.
Cleeman's Forceps.
(Amer. Jour. of Obs. XI.).

1878. Barnes.

A modification of M. Tarnier's forceps by Dr. Robert Barnes was shown before the Obstetrical Society of London on July 3, 1878: "The branches of traction were divided in half so as to slip readily into their places and were secured to the angles of the blades in place of, as in the original forceps, working on after the blades were *in situ.*"

1878. Veddar.

This American Obstetrician had made a very simple improvement to the forceps, which allows it to draw in the axis of the superior strait without the intervention of special traction-rods. At the middle part of each branch, between the articulation and the lower end of the fenestrum, there is an articulation in the shape of a hinge, which allows the handles to be brought from above downwards, while leaving the blades

immovable. In this way traction may be made much more backwards than with the ordinary forceps. Finally, these hinges allow the instrument to be employed by the obstetrician either like the instrument of Levret's style or like that of Morale's type with the perineal curve.

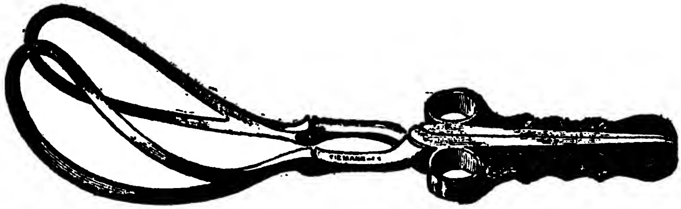


FIG. 592.
Vedder's Forceps.
(Tiemann).

This advantage however, falls short of the satisfactory direction of traction, attained either with ribbands or with Tarnier's forceps.

1878. Anderson.

Dr. Anderson devised a forceps which combines the merits of Simpson's and Barnes' curved forceps. He adopts Simpson's handle in contradistinction to Barnes' but has omitted the plan Simpson was so fond of, in all his instruments, of having them

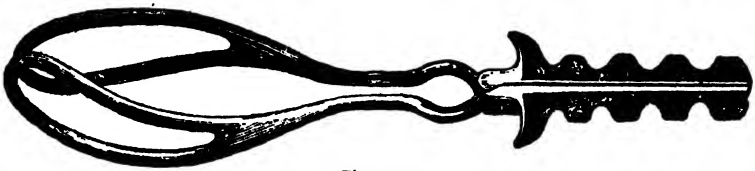
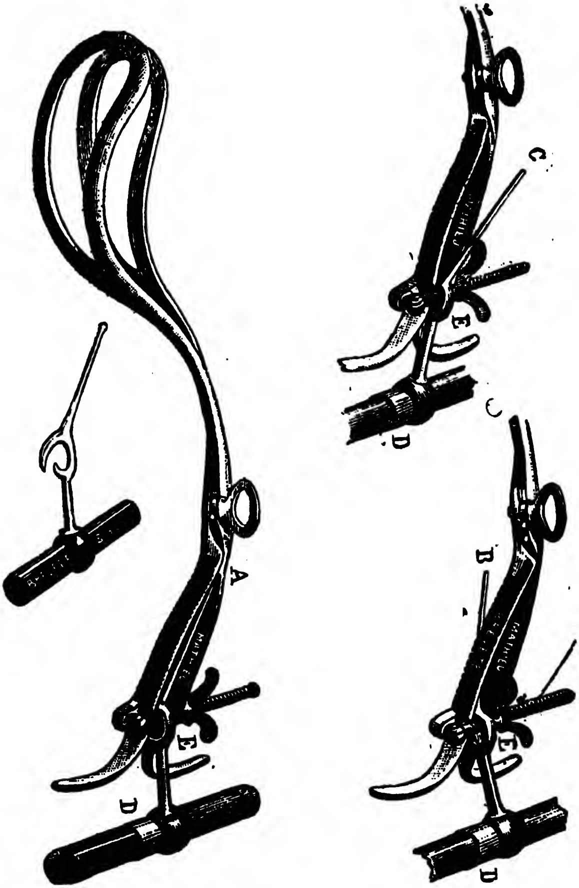


FIG. 593.
Anderson's Forceps.
(Arnold and Sons).

roughened to indicate the direction of the curve. In some other points also Dr. Anderson's differs from both Simpson and Barnes' forceps. The cephalic curve is much less than in either and the distance between the points of the instrument when closed is little more than three quarters of an inch, instead of an inch as in the others.

1878. Mathieu.

Messrs. Mathieu constructed a forceps with a guiding needle for indicating traction in the proper direction. The forceps is drawn with a handle, which carries a needle and



FIGS. 594—7.
Mathieu's Indicator Forceps.
(Poullet).

which is applied to a transverse screw passing the lower ends of the handles near the hooks. (See figs. 594-7). These forceps present the perineal curve.

Mathieu constructed several other forceps (1) demountable (See figs. 598-9) (2) with perineal curve, (See fig. 600) and with axis-traction arrangement with cords. (See figs. 601-3).

1878. Sanctuary.

He modified Dr. Duncan's forceps. There is "an ingenious contrivance by which the first blade was prevented from rotating by a movable bar attached to the handle of the left blade."

1878. Porteus.

He found that patients have a great objection to cold steel; and even the metallic ring seems to strike awe into them. To obviate these objections he had made a forceps with Aveling's blades and Simpson's handles, slightly altered and covered with vulcanite. For it, he claimed that it was easily heated (by friction), easily kept clean, easily applied, had not metallic ring, and no appearance of steel.

1878. Reid.

Dr. W. L. Reid of Glasgow devised a new (antero-posterior) form of long forceps, whose chief peculiarity is the possession of a marked perineal curve. He claims the following advantages for his forceps: (1) they enabled the accoucheur to pull in the right direction; (2) the head, when occipito-posterior, is allowed to rotate; (3) the head is allowed to come down in its own way.

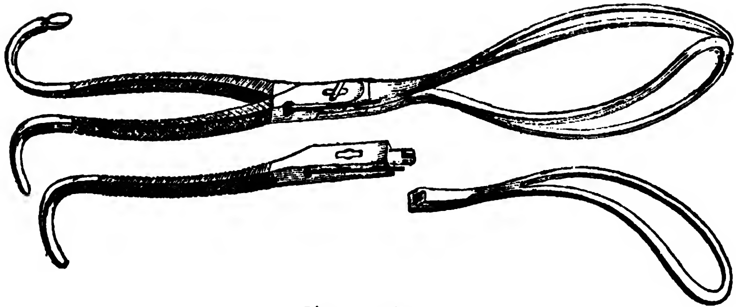
1878. Bell.

Dr. Charles Bell exhibited before the Obstetrical Society of Edinburgh a new kind of long straight forceps which he had found most useful in practice.

1878. Morgan.

Herbert M. Morgan invented new tractors for midwifery forceps. He described them as follows:—

"When I had once thoroughly examined the ingenious new midwifery forceps of M. Tarnier I saw immediately that



Figs. 598-9.
Mathieu's Disjointable Forceps.
The lower figure shows the manner of disjointing.
(Mathieu).

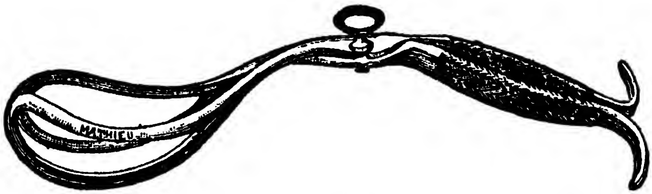
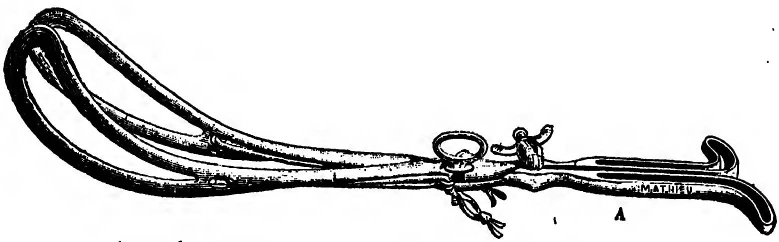
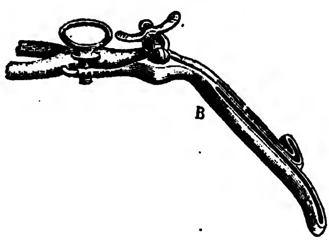


Fig. 600
Mathieu's Forceps with Perineal Curve
(Mathieu).





Figs. 601-2.
Mathieu's Forceps.

A. With screw for fixation or pressure and special apertures for attaching strings of traction.

Do with handles curved.

(Mathieu).

his principle gave to those who used the instrument a new power, in a new direction, I set to work to try if the best part of his principle could be arranged in an effective portable and cheap form so as to be applied to the different patterns of existing long curved forceps. My objections to M. Tarnier's instrument are that it is bulky, cumbersome, costly and not

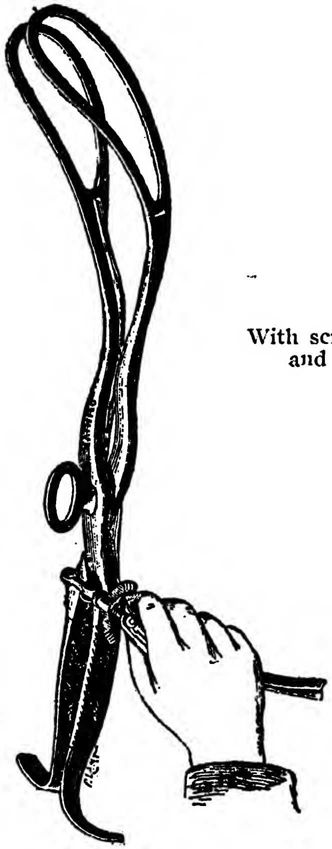


FIG. 603.
Mathieu's Forceps.
With screw for fixation or compression and special holes for fixing the cords of traction.
(Witkowski).

very easy of application though it is most valuable when once *in situ*. After several experiments I have succeeded in getting made a pair of tractors which can be hooked on any long curved forceps (after application) can be as readily detached (Tarnier's are fixed by a hinge-joint) and are very portable and cheap.

By means of my tractors, one can use power in a new direction—viz., in the middle of the curve of the forceps instead of in the long axis of the handles in some cases with advantage. The tractors alone give power in such a direction as can only be got in the ordinary way with both hands or by a leverage of the wrist. I am accustomed to slip an India-rubber ring (about twice as large and strong as those used for umbrellas) on the handles of the forceps when *in situ*: this is better than tying with tape as it yields somewhat and accommodates itself to circumstances. The handles when thus fastened move in the direction in which traction ought to be made and so form a safe guide in what direction to pull." (See fig. 604).

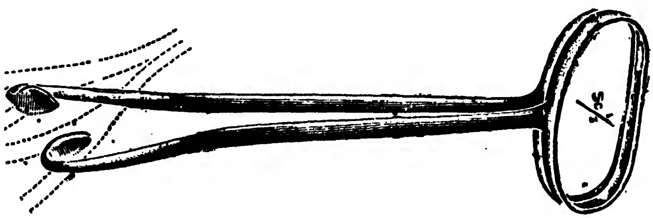


FIG. 604.
Morgan's Axis-Tractors.
(S. Maw, Son and Sons).

1878. Sullivan.

J. F. Sullivan invented a pocket forceps.

1879. Simpson (A. R.).

Alexander Russel Simpson was born at Bathgate on April 30, 1835. He graduated as M.D. Edin. in 1856 and then visited the continent, studying at the Universities of Montpellier and Berlin. On returning from the continent, he was assistant for seven years to his uncle Sir James Y. Simpson. Afterwards he was in practice for five years in Glasgow. On the death of his uncle, in 1870, he was appointed to the chair of midwifery, which he held until 1905. He was also physician for diseases of women at the Royal Infirmary, Edinburgh and to the Royal Maternity and Simpson Memorial Hospital. He made numerous contributions to medical literature. He died

in Edinburgh on 6 April, 1916, as the result of a motor car accident.

Professor Alexander Russell Simpson, exhibited before the Obstetrical Society on March 19, 1879, a pair of Simpson's forceps to which he had fitted a Tarnier's traction-rod upon the back part of the fenestrum of each blade. The handles were so altered with a notch and bar and screw attached, as to enable the operator to consolidate the forceps before proceeding to extract by tightening the screw to the necessary extent.

Professor Simpson read a paper on "Axis-Traction Forceps" on 21 July, 1880, before the Obstetrical Society of

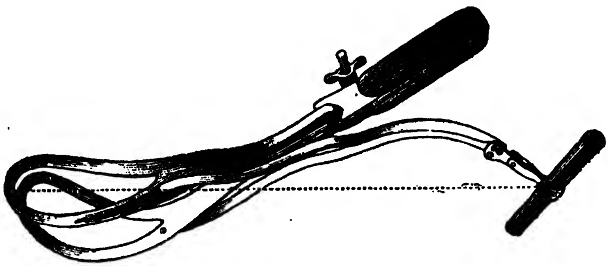


FIG. 605.
Simpson's Axis-traction Forceps.
(Simpson).

Edinburgh, and gave the following description of the forceps:—"After a series of experiments, I have succeeded in getting a pair of forceps made which I do not pretend to look on as finality but which I am prepared to commend to my fellow practitioners as having all the advantages of their own familiar implement with the superadded benefit of traction-rods articulated to the blades.

What I ask you to notice first is that this forceps is simply in its basis the ordinary Simpson forceps without the knees or traction-hooks on the handles. The handles have had their hooks and ridges smoothed off them, because they are to be used solely for applying and fixing the blades and are to be left untouched whilst traction is being effected. They are to be known as the "Application-handles" in contra-distinction

to the new "Traction-handle." The fixation-screw is much smaller than that on the Tarnier forceps, because it can never strongly enough be impressed on the mind that the screw is not to be used in the slightest degree as a means of approximating the blades or compressing the head." "I have not found it necessary to make any change in the curves of the instrument." "I am bold to fancy that the traction-rods attached to our forceps are an improvement on those of Tarnier. I have stated that his traction-rods are fitted into a single stem which with the traction-bar is detached from the rest of the instrument

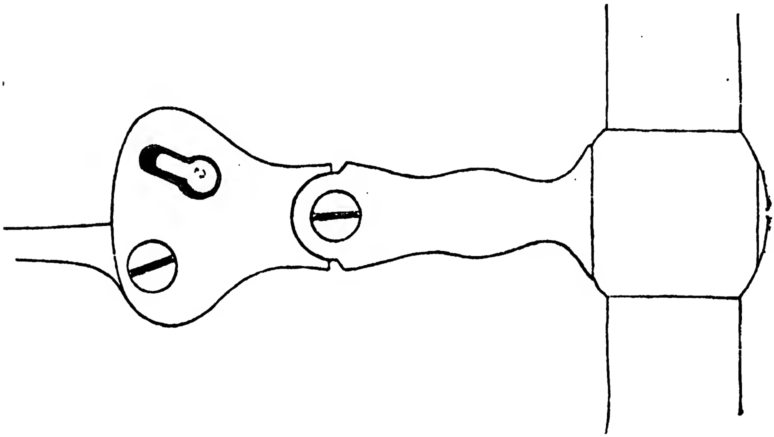


FIG. 606.
Locking-plate and joints of the traction-handle (full size) of Simpson's Axis-traction Forceps.
(Simpson).

when it is not in use. .... I have preferred to have this entire traction apparatus permanently attached to the blades (See fig. 605). The traction-bar or handle is joined (*a*) to a plate which is permanently jointed in its turn to the left traction-rod (*b*), and which has an opening with a slot (*c*) wherein the free extremity of the right rod is readily locked. The left rod can be fixed with a catch to the shank of its own blade, so that the introduction of it is effected in the same way as the blade of the ordinary forceps. The right rod swings

free ;............ When the blades have been applied and locked, the left rod is freed from its catch and the right rod is pushed back and fixed in the locking-plate before adapting the fixation-screw." (See fig. 606).

The words "Left-Lower-First" are stamped on the handle of the left or lower blade.

Professor Simpson made a further communication regarding Axis-Traction forceps, before the Edinburgh Obstetrical Society in July, 1883. As the result of criticisms and suggestions, he increased the length of the forceps to 9 inches from the lock to the tips of the blades. He also made a slight change in the flattened extremities of the rods to which the knobs are attached; as it was found that owing to the rods meeting the locking-plate at an angle, the head of one of the knobs or buttons was liable to break. By making the flattened ends of the rods pass at an angle from the stem and lie parallel to the locking-plate, all risk of such an accident was obviated.

Doran's Description of a sample of Sir A. R. Simpson's Axis-Traction Forceps, in the museum of the R. C. S. :—"Length of traction-rods, including locking-plate and joints of traction-handle, 11 in (27.9 cm.) not measured by curve ; length of traction-handle 7½ in (19 cm.).

As in Sir James Simpson's forceps, the shanks of the blades part considerably above the lock to allow the fingers to be placed between them; English lock. The metal of each blade is continued the whole length of the application-handles. It is coated outside with perfectly smooth ebony, no finger-rest, no lateral finger depressions. In place of palm-rests, the wood at the free ends is everted and rounded as in Tarnier's axis-traction forceps and in many foreign forceps of the ordinary type. The fixation-screw closely resembles that which is fitted to Tarnier's forceps (No. 56 B), though the hinged part and the gap in the ring are made so that the screw moves horizontally and the travelling screw has much shorter wings.

The traction-rods articulate with the blades by a little shoulder, so that they are level with the blades and swing on a pivot. This mechanism was adopted by Tarnier for his 1877 model but is greatly modified in the sample of Tarnier's

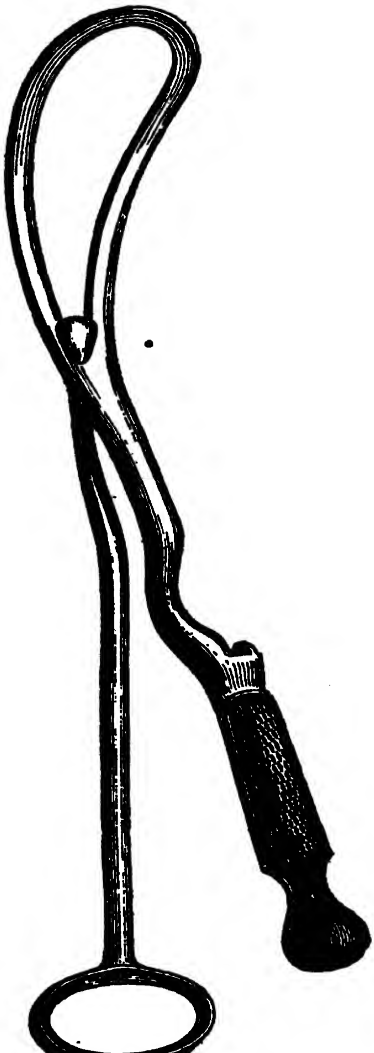


FIG. 607.
Duke's Tractor.
(Brit. Med. Jour. 1879 i)

forceps in this collection. In place of the universal joint connecting the traction-handle with the rods there is a locking-plate to which the left traction-rod is permanently jointed by a screw on which it swings laterally and a slot into which a screw on the right traction-handle, firmly attached to the piece of metal, can be rotated as much as the operator desires.

This instrument is described in Sir Alexander Russell Simpson's "Again on Axis-traction forceps." *Trans. Edin. Obs. Soc.* vol. xiii, 1883, p. 143. He explains in full length its special advantages and lays much stress on the importance of easy locking and unlocking of the traction-rods, attained in his experience by the locking-plate above described."

1879. Duke.

Dr. Alexander Duke of the Rotunda Hospital Dublin modified Morgan's tractors so that the tractors could be introduced *with the blades and before the forceps are locked and not after the forceps are locked,* as in Morgan's tractors. These, not being hooks but having a shield-shaped extremity, can be buttoned into the fenestra of each blade before introduction. These tractors were intended to "give additional power of traction and in the proper direction."

"When additional traction is required. .... I slip the rings of my tractors into an ordinary swivel, attached by metal band to a strap, which I have previously buckled round my waist and can thus make any amount of traction consistent with safety, with the greatest ease to myself."

1879. Keiller.

Alexander Keiller was born at Arbroath, Forfarshire, on November 11th, 1811. He died from apoplexy at his country residence at North Berwick on September 26th, 1892, at the age of nearly 81. In 1835 he obtained the M.D. degree of the University of St. Andrews. In 1837 he settled in Dundee and continued in practice there until 1844. In 1853 he was appointed Lecturer on Midwifery and the Diseases of Women and Children in the Medical School, Surgeon's Hall, Edinburgh and resigned

this appointment in 1884. He was an Honorary Fellow of the Obstetrical Society of London. He was the author of numerous papers. He also invented or modified numerous midwifery instruments.

Dr. Keiller directed attention of the fellows of the Edinburgh Obstetrical Society (on Feb. 12, 1879) to a notice and illustration of Dukes' tractors, and reminded the Society that "he had occasionally used a similar hook or tractor for the same purpose viz., that of aiding the blades of the forceps in drawing the child's head downwards and backwards instead of forwards, which more natural direction the ingenious forceps of Tarnier were principally intended to accomplish. On Dr. Keiller fixing the hook, into the fenestrum of his lower forceps blade and comparing it with Dr. Duke's woodcut, the

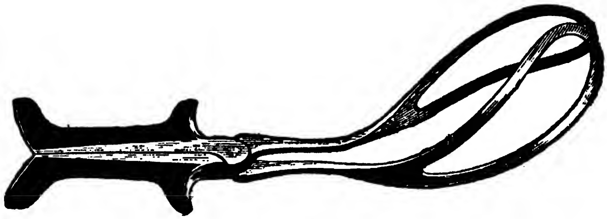


Fig. 608.
Jenk's Forceps. (Long).
(Tiemann).

only difference observed was in the ring extremity of the latter, which was said to be useful in applying additional power when extraordinary extractive force was necessary."

1879. Jenks.

Edward Watrous Jenks was born at Victor, New York in 1833. He began his medical training at the University of New York in 1853; continuing it at Castleton Medical College. He began practice at Ontario, Indiana and remained there till his removal to Detroit in 1864 excepting two years spent at Warsaw, New York and one winter at Bellevue Hospital, Medical College of New York. When Dr. Jenks settled in Detroit, he founded the Detroit Medical College in 1868, and was

its president and professor of obstetrics till 1880. He was also gynecologist to Harper's Hospital and St. Mary's Hospital, Detroit and of Woman's Hospital. He contributed quite a large number of papers in the medical journals. He died in March, 1903, of pneumonia, on the cars between Detroit and Chicago.

For illustration of Jenk's long forceps (see fig. 608).

1879. Hilliard.

Mr. F. Hilliard, surgical instrument-maker of Edinburgh, invented a pair of forceps. By a second handle, attached to a crossbar, connected with the handle, traction could be made in the same direction as with Tarnier's forceps, for which they were intended as a substitute. (See fig. 609).

The following account of the forceps is given by his brother Dr. R. H. Hilliard.

"It consists of a peculiarly bent steel bar with two hinged processes and a transverse wooden handle; these two processes fit into corresponding slots or sockets, which can be easily attached to the handles of any midwifery forceps.

In using the instrument, the forceps is first applied and locked in the usual way, after which the lever is readily adapted. The right hand grasps the transverse handle of the lever while the left is firmly closed upon the handles of the forceps; traction can then be made in the proper direction with greatly increased leverage, and without necessitating any change of posture on the part of the operator.

The instrument is on the same principle as Tarnier's forceps, of which it is a modification. I have used it with great satisfaction, and believe it to be a valuable addition to the ordinary forceps."

1879. Roberton.

Mr. Roberton of Manchester devised a forceps, which is alluded to by Dr. J. Thorburn.

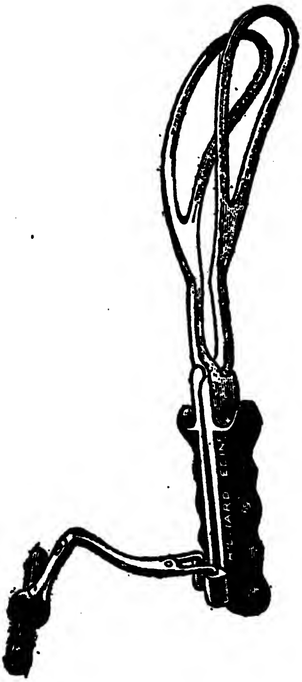


FIG. 609.
Hilliard's Forceps.
(B. M. J. 1880, i).

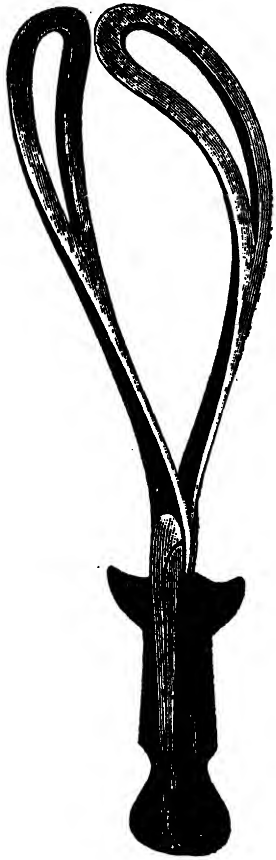


FIG. 610.
Breisky's Forceps.
(Jetter and Scheerer).

1879. Thorburn.

John Thorburn was born at Huddersfield in 1834, his parents shortly after removing to Manchester. After taking his degree at the Edinburgh University in 1855, he held the posts of House Surgeon, and House Physician in the Royal Infirmary, and also that of House Surgeon to the Royal

Maternity Hospital. He left Edinburgh shortly after and came to London, where he became resident at the Brompton Chest Hospital. In 1858 he returned to Manchester, where he held some obstetric appointments. In 1873 he was appointed to the chair of Obstetric Medicine in the Victoria University. He was a Vice-President of the Obstetrical Society of London from 1881-1883. He died in 1885.

Thorburn showed before the Obstetrical Society of London on 4th June 1879, a pair of forceps, adapted for greatly increasing at will, its compressive power. He described it thus:—"The instrument without the special adaptation, is that of my late friend, Mr. Roberton of Manchester, with the handles and shanks each elongated about an inch. The increased thickness and weight rendered necessary by this increased length give it a clumsy appearance, which has nothing to do with the essential feature. The handles can be united by a firm and simple clip at their extremities and the ends nearest to the blades can be slowly but powerfully separated by a screw passing through one of them. The result is to approximate the blades to the extent of almost touching at their points and thus to increase the compressive power.

The screw can easily be attached to any forceps and the place of the clip can be supplied by a ligature of tape or string."

1879. Marshall.

Dr. Marshall of Morttake designed a new midwifery forceps, the novelty of which consists in each blade being allowed to rotate on its axis to a limited extent by means of a pivot joint introduced into the shank just below the fenestrated part. By this means the blades apply themselves perfectly flatly to the sides of the child's head, not pressing with one side of the blade more than with the other, as is very commonly the case with the ordinary forceps. The grasp of the head is firm and solid and being spread over evenly over a large surface there is much less of chance of injury to the child. Locking also is facilitated.

1880(?). Breisky.

August Breisky was professor at the clinic at Prague. He became director of the Spathsche Klinik at Vienna. He died on 25th May, 1889. He constructed a forceps an illustration of which is given in fig. 610.

1880(?) Boisliniere.

Louis Charles Cherot-Boisliniere was born in the Island of Guadeloupe, one of the West Indian possessions of France, on September 2, 1816. Following the custom of the times, he was, at an early age taken to France to continue and complete his education.

After a thorough grounding in the elements by private tutors, he entered the University of France, where he took his degree in letters and arts. He then began the study of law in the same University, and in due course of time received the degree and license to practise in the French Courts. About this time there was held a competitive examination among the licentiates of law for the purpose of elevating one of their number to a vacant professorship. This position was for life and Mr. Boisliniere secured the prize.

Owing to the unsettled condition of his native island, on account of the emancipation of the negroes, he resigned his right to the professorship in favour of the candidate next in excellence and returned to Guadeloupe. Here he found things in such an unsettled condition and knowing full well that it offered no future for him, he decided to make his future home in the United States. He reached New Orleans in 1842, having the intention of practising law. Finding however that a thorough knowledge of the English language was necessary to success even in that French community, he went to Kentucky. While there, he decided to take up the study of Medicine.

He completed his medical studies in 1848 at the St. Louis Medical College and immediately entered the active practice of his profession. He turned his attention to obstetrics and gynæcology and in 1870 was called to the chair of obstetrics,

gynæcology and diseases of children in the St. Louis Medical College, conducting at the same time a large gynæcological clinic at the St. Louis Mullanphy Hospital.

In 1879 he received the degree of LL.D. from the St. Louis University. He was also elected an honorary member of the Anthropological Society of Paris and an honorary fellow of the American Association of obstetricians and gynæcologists.

As an obstetrician he was aggressive and bold but at the same time prudent and conservative. He was the pioneer of the obstetric forceps in the West and fought its battle against what seemed insurmountable opposition, until the victory was complete and that great "prime mover of obstetrics and conservator of infant life" is found in the obstetric bag of every practitioner.

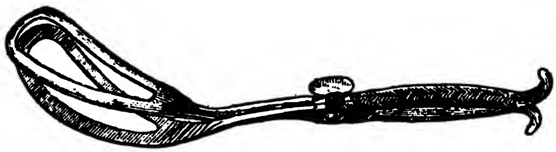


FIG. 611.
Boisliniere's Forceps.
(Boisliniere).

Early in his medical career he became convinced of the ethical wrong and unscientific proceeding of craniotomy upon the living child and not once was this operation resorted to, in his obstetric experience extending over forty-five years.

He contributed a great many articles to medical literature and was active in the debates of the medical societies of which he was a member. For sometime before his death he was busily engaged upon the crowning work of his life, namely *A Treatise upon Obstetric Accidents, Emergencies and operations*, based upon an obstetric experience of nearly fifty years. It was in press at the time of his death which occurred on January 13, 1896.

Although he had passed his eightieth birthday, he was active to the last; never having relinquished his practice he had the satisfaction of "dying in the harness."

In the forceps designed by Boisliniere, it was sought to combine the merits of the Hodge, the Pajot and other instruments and at the same time to correct their deficiencies. The points in its favour are (1) it is a long forceps with a marked pelvic curve, thus facilitating its application at or above the superior strait; (2) it has a marked cephalic curve doing away with the danger of over-compression of the head and affording a surer purchase, which is further secured by a slight roughening of the inner surface of a "Knee" at the junction of the blade and shaft, thus removing a serious threat to the integrity of the perineum; (3) it has a permanent lock, with

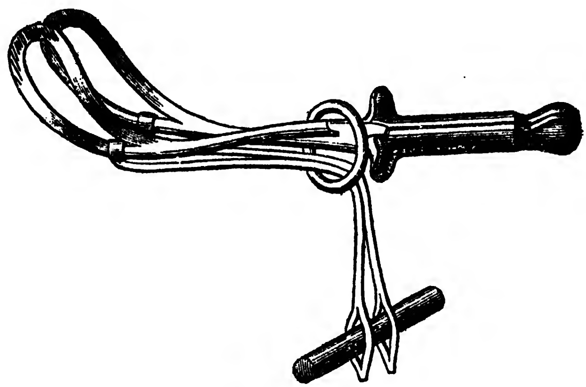


FIG. 612.
Sanger's Axis-traction Forceps.
(Ingerslev).

no key to get lost or to fall off at a critical moment; (4) the roughness of the handles permits a secure grasp.

"Measurements:—Total length 17 inches; length of fenestra 5 inches; greatest width of fenestra 1½ inches; narrowest ½ inch; width of cephalic curve 2¼ inches; Weight 19 ounces. Permanent lock."

1880. Bartlett.

Dr. John Bartlett devised an axis-traction forceps, identical in principle with the instrument constructed in 1860 by the elder Hubert.

1880. Sanger.

Sanger has added to an ordinary forceps, thongs of soft leather, attached at the point where Tarnier has articulated the traction-rods. A rubber ring like a pessary, is placed above the lock of the forceps and the whole forceps and the two thongs are passed into this ring. The two thongs carry at their inferior extremity a small stick, constituting the handle. When this stick is drawn upon, the thongs become stretched, the elastic ring yields a little and the direction of traction becomes fairly satisfactory. Poullet thinks that the elastic ring is of no use. Sanger retains the Brunninghausen joint. There is thus no continuous screw pressure on the head as the branches could be disjointed at intervals to relieve the head from continuous pressure.

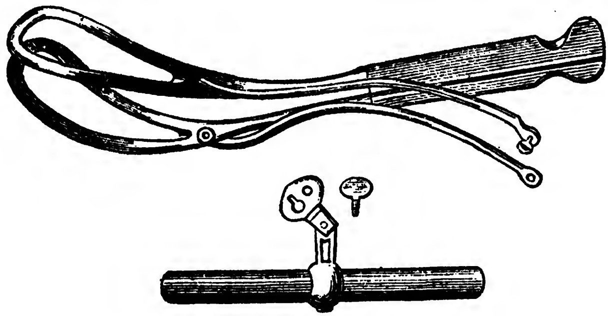


FIG. 613.
Sanger's "German Axis-traction Forceps."
(Ingerslev).

Later, he made another forceps, under the name "German Axis-Traction." It is an ordinary German forceps with Simpson's traction appliances. The cross-bar handle is not permanently fixed to the traction-rods and there is no screw.

1880. Lusk.

William Thompson Lusk was born at Norwich, Conn. on May 23rd, 1838. In 1855 he entered as a freshman at Yale University but left college on the completion of his first year. For three years, he studied medicine at Heidelberg and at

Berlin. In 1861 while still a medical student, the war of the Rebellion broke out and he enlisted as a private in a regiment of New York volunteers. In 1864, after a service of 3 years in the Federal army, he took his degree in medicine from the Bellevue Hospital Medical College in New York. After his graduation he again visited Europe for further study in the Hospitals of Edinburgh, Paris, Prague and Vienna, (1864-1868). On his return to the United States, he was appointed Professor of Physiology in the Long Island College Hospital and continued to occupy that chair until 1871; when he became Professor of obstetrics in the Bellevue Hospital Medical College. This chair he continued to hold to the time of his death.

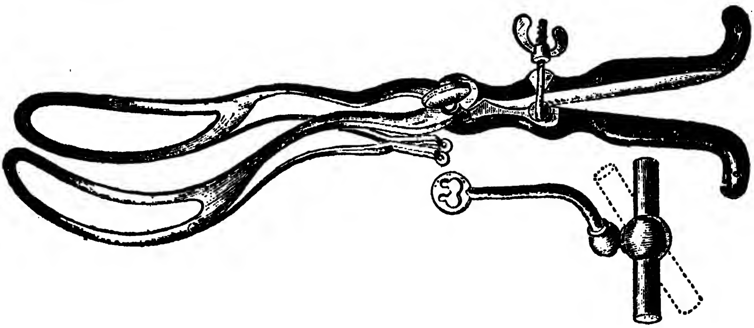


Fig. 614.
Lusk's Axis-traction Forceps.
(Lusk).

His contributions to contemporaneous medical literature were numerous and of a very high order but it was the publication in 1881, of his excellent text-book 'The Science and Art of Midwifery' that brought his name prominently before the medical world. This book was translated into French, Italian, Spanish and Arabic.

He was the recepient of a large number of Honorary distinctions.

Endowed with an abounding vitality and a spare build, he seemed the most unlikely person in the world to be struck

down permaturely by an attack of apoplexy. The end came on June 12th, 1897.

Lusk modified Tarnier's original model by having the blades made lighter and modelling them somewhat like Wallace's instrument. He has also improved the manner of adjustment of the traction-rods to the traction-bar. In place of the very clumsy socket joint he has substituted the key arrangement (see fig. 614), by means of which the handle can be adjusted or removed in a few moments.

1880. Burge.

J. H. Burge designed an instrument in which the blades and handle are made separate and the lock being in the end of the handle, allows the choice from as many blades as one pleases to carry. The free extremities of the blades B. B. projecting on either side of the handle, form levers by which

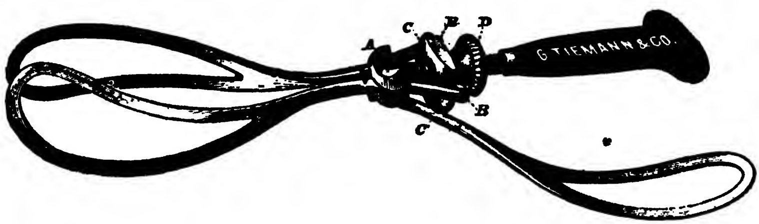


FIG. 615.
Burge's Axis-Traction Forceps.
(Tiemann).

the blades are separated or approximated at will, being acted upon by the side C. C. which may be fixed at any point by means of the nut D. The amount of compression which the blades shall make upon the fœtal head is under perfect control. (See fig. 615):

1880. Ives.

Ives's forceps is illustrated in Tiemann's Catalogue. (See fig. 616).

1880. McLane.

McLane constructed a forceps with solid, non-fenestrated blades. (See fig. 617).

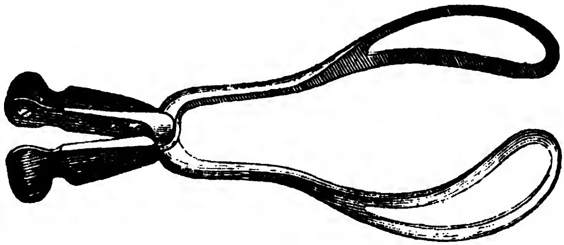


Fig. 616.
Ives' Forceps.
(Tiemann).

1880. Miller.

Dr. DeLaskie Miller, Professor of Obstetrics in Rush Medical College, constructed a forceps, which "is 14¾ inches long, the width between the points of the blades ¾ of an inch,

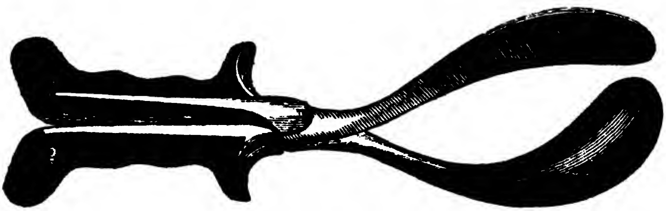


Fig. 617.
McLane's Forceps.
(Tiemann).

the blades are 6¾ inches long and 3 inches apart, the handles are folding and thus the instrument made more portable." (See fig. 618).

1880(?) Wilson.

Ellwood Wilson was born on February 4 1822 in Bucks County, Pennsylvania. When 19 years of age. he went to Philadelphia and became an apprentice in a drug store. He

remained there about 4 years, at the same time prosecuting the study of medicine. In 1845 he was graduated from the Jefferson Medical College. In the same year, he was appointed physician to the Philadelphia Dispensary which furnished a long roll of obstetric and gynæcological patients. Professor Charles

FIG. 618.
Miller's Forceps. (Jointed).
(Tiemann).

FIG. 619.
Wilson's Forceps
(C. Lentz & Sons).

D. Meigs soon secured his services as his assistant. In 1846 Dr. Wilson became associated with Dr. Warrington in the Philadelphia Lying-in charity, and eventually succeeded him. Owing to his very large private practice he resigned that position

in 1862. His contributions to obstetric and gynæcological literature were not many but he became engaged with Dr. William Goodell in a discussion upon the relative value of podalic version and forceps in narrow pelves and submitted many papers on the subject. He was one of the earliest members of the American Gynæcological Society and was elected one of its vice-presidents. He read a paper on "Tarnier's forceps" before this society. He died at his country seat near Philadelphia on July 14, 1889.

For illustration of his forceps (see fig. 619).

1880. Playfair.

William Smoult Playfair was born at St. Andrews in 1836. His father George Playfair was Inspector General of Hospitals in Bengal. After graduating in Medicine at Edinburgh in 1856, he completed his medical education in Paris. Aspiring to follow the steps of his father he entered the Indian Medical Service in 1857, serving in the Bengal army as Assistant Surgeon in Oudh during the mutiny. Upon the more settled state of that province, he obtained the post of Professor of surgery at Calcutta Medical College in the years 1859-60. His health having been affected by the climate of India, he went to establish himself at St. Petersburgh, where he remained for 6 months. He returned to London in 1863, with no definite plans in his mind. But about that time the post of Assistant Physician for the Diseases of Women and Children to King's College Hospital, fell vacant. This was Playfair's opportunity and he was elected to the post thus gaining what he sought. On the retirement of Dr. Priestley in 1872, Dr. Playfair was appointed Professor of Obstetric Medicine at King's College and Obstetric Physician to King's College Hospital. These appointments he held for 25 years.

It may be mentioned that it was almost by accident that he took up the subjects of obstetrics and gynæcology as his future pursuit in life, on obtaining his appointment in 1863. He however developed rapidly into an advanced position in these arts. Indeed, he admitted that at this particular juncture

of his life, he knew no more about obstetrics than he did about astronomy. He was the first to decline to hand over his patients to the general surgeon for operation, thus setting the example of obstetricians operating upon their own patients.

Honours came quickly upon him. His contributions to the distinctive literature of his profession were numerous.

For some years before his retirement he was troubled with some enlargement of his prostate, for which he underwent an operation in August 1902. On his recovery he went to Rome and for a time enjoyed good health. He was seized with an attack of apoplexy at Florence on 24th March 1903. He desired to return to his native town of St. Andrews and to that place he was brought by easy stages. The symptoms of old-standing kidney mischief supervened and he died on August 3rd, 1903.

Playfair evidently constructed a pair of forceps, (see Lynch's catalogue 828 C.) but there is no reference to his forceps in his book on midwifery. No diagram is available.

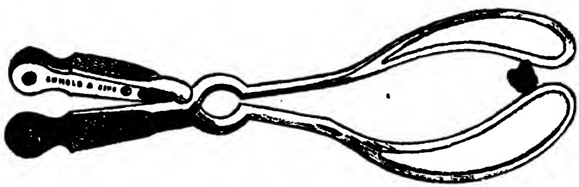


FIG. 620.
Godson's Forceps.
(Arnold and Sons).

1880. Godson.

For an illustration of this forceps, see fig. 620.

1880(?) Holmes.

Holmes' forceps is alluded to in Lynch's catalogue (820).

1880(?) Mackintosh.

Mackintosh's forceps is alluded to in Lynch's catalogue (827).

1880(?) Neal.

Neal's Axis-Traction forceps is mentioned in Tiemann's catalogue but is not illustrated.

1880(?) Paramentier.

A forceps with movable traction-handle is illustrated in Witkowski's Obstetric Arsenal. (See fig. 621).

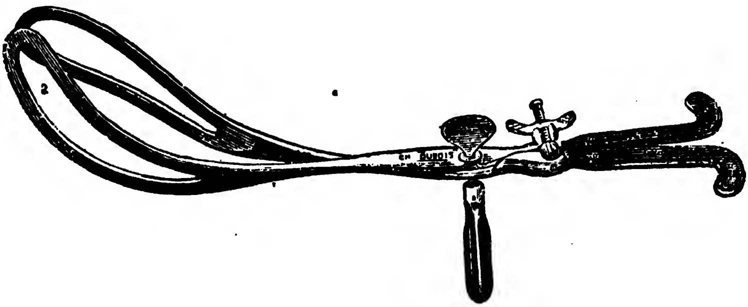


FIG. 621.
Paramentier's Forceps.
(Witkowski).

1880(?) Mathew.

For an illustration of this forceps, see fig. 622.

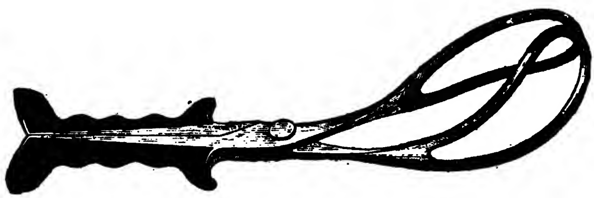


FIG. 622.
Mathew's Forceps.
(Tiemann).

1880(?) Blake.

For an illustration of this forceps, see fig. 623.

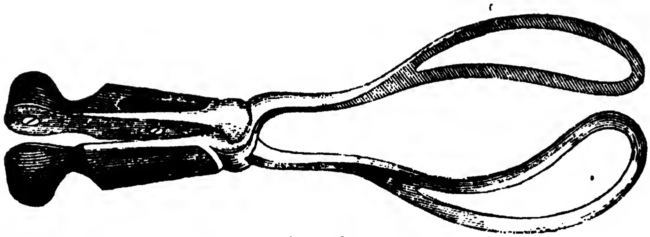


FIG. 623.
Blake's Forceps.
(Tiemann).

1880(?) Hale.

Two varieties, long and short, of Hale's forceps are referred to and illustrated. (See fig. 624).

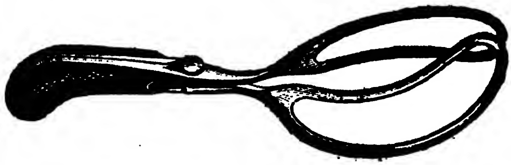


FIG. 624.
Hale's Forceps.
(Tiemann).

1880(?) Corning.

An Axis-Traction forceps is illustrated in Tiemann's catalogue (See fig. 625). This diagram was reproduced by mistake in the Amer. Jour. of Obs. XIII, 373 to illustrate Lusk's axis-traction forceps. A note of correction appeared on p. 678 where it was mentioned that "the cut there published

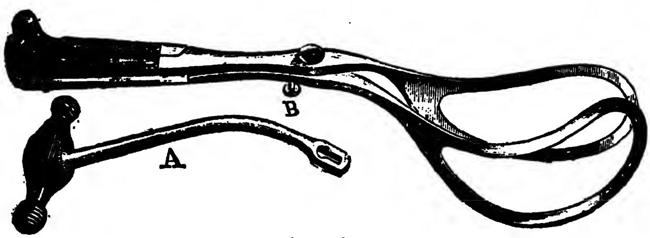
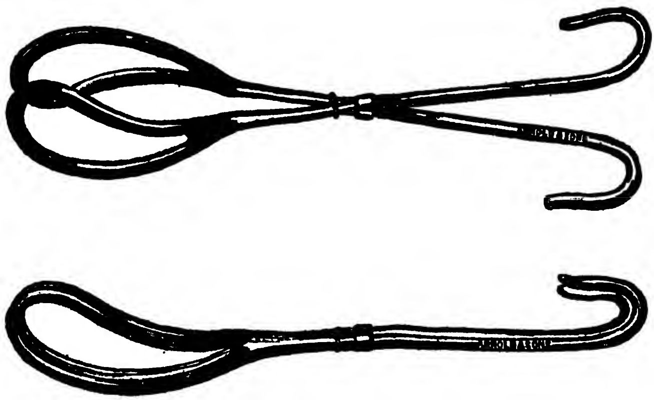


FIG. 625.
Corning's Forceps. (Axis-traction).
(Tiemann).

is that of Cleeman's forceps." This, again, is a mistake. The illustration represented Corning's forceps, which was manufactured by G. Tiemann & Co., of New York.

1880(?) Duke.

"The forceps can be used by those devoid of much skill; in fact it is for such and not for the adept at the ordinary instrument, that I suggest its use. It requires no locking, as that is already done and there is consequently no danger of pinching the maternal soft parts. Both blades as I said, are introduced together one lying within the other. Then one is



FIGS. 626-7.
Duke's Forceps.
(Arnold and Sons).

turned very slowly little by little round to the opposite side of the child's head. To facilitate this and to overcome any obstacle the blade may meet with in its semicircular journey my forceps possesses a joint which admits of all motions—upwards, downwards, inwards, outwards, backwards, forwards etc. The curved handles show the practitioner when the blades are evenly opposite to each other and by keeping his middle finger during traction between the distal ends of the handles, he obviates all risk of too much pressure on the head. In the intervals between traction, all compression can be removed." Lancet. (See figs. 626-7).

1880(?) Garland.

Dr. Garland of Boston evidently constructed a forceps. This is referred to, by Partridge.

1881(?) Lyon.

J. G. Lyon devised a pair of "remarkable Axis-Traction rods for midwifery forceps." He states:—"The Axis-Traction rods are the result of many experiments and trials. They provide for all Mr. Tarnier's requirements and have in addition, the following advantages:—they may be fitted to any pattern of pelvic curved midwifery forceps; they are perfectly simple and easy to use; and do not in the slightest degree complicate the introduction or locking of the blades of the forceps. If not required they can be detached completely—leaving the forceps unaltered except by the addition of a small bridge of metal, soldered across the bottom of each fenestra (figs. 628 & 631 *a*) so as to form a rounded aperture, into which the thinned flattened hook (fig. 630) of each traction-rod slip, when at right angles to the blade on its outer face, but only in this position. This bridge prevents the hook from slipping out when the rod is brought parallel with the shanks.

The rod of the left or lower blade has, attached to its free extremity, the traction-handle with its swivel-joint (fig. 631 *b*) and the lower half of the right rod (fig. 631, *c.f.*) which is divided about its middle.

The upper half of the right rod hooks into the aperture of its blade; and is so contrived that its lower end springs on with a light clamp to the shank of the forceps at a distance above the lock, just sufficient to keep it clear of it (fig. 628, *d, e.*).

The junction between the upper and lower portions of this right rod (fig. 628 *e* and fig. 631 *f.*) is effected by means of an extremely simple and easily worked wedge-joint or lock which is at the same time perfectly strong and efficient. This joint is shown in fig. 629 *e f*.

To use these traction-rods, the left traction-rod is hooked into the left or lower blade of the forceps; and it being held

FIGS. 628-632.

Represent the removable axis-traction rods of Lyon fitted to Roberton's forceps.

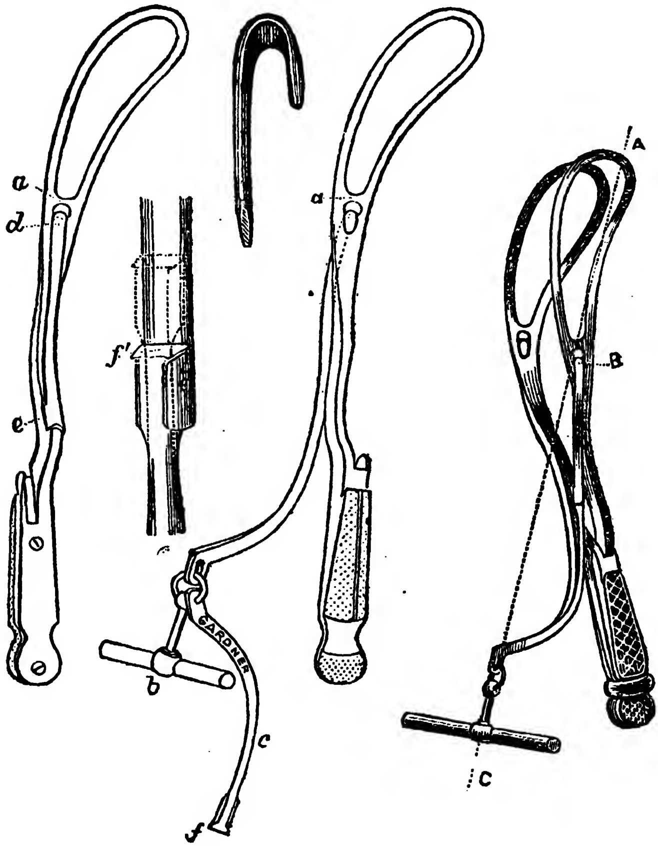


FIG. 628, 629, 630. FIG. 631. FIG. 632.

FIG. 628.— Right or upper blade carrying upper half of its rod (*d*,*e*) clamped on to shank at (*c*).

FIG. 629. The Wedge. bolt (*f'*, *e'*) by which the wedge of right rod is connected with the clamp of the upper portion (*e*).

FIG. 630. The hook by which the rods are attached to forceps.

FIG. 631. Left or lower blade, with its traction rod and lower half of right rod (*c*) both attached to swivel traction handle (*b*).

FIG. 632.—General view. (B. M. J. 1881, i, 425).

along with the handles the blade is introduced as usual. Then the small upper portion of the right rod is hooked into the right blade and its lower end spring on to the shank. (Practically, it is as well to keep it always *in situ* as it is more easily carried and can not be mislaid). This blade can then be introduced in the ordinary way and the forceps locked as the rod does not, in the slightest degree interfere with either the introduction or the locking. A stout India-rubber ring (similar to an umbrella ring but stouter) is now to be slipped over the handles of the forceps or they may be tied together; and the lower end of the right rod being free from its attachment to its shank, its lower portion, at present hanging loose, attached to the traction-handle (fig. 631, *c*) is brought up and guided by the finger and its catch.

The rods being now complete, traction is to be made entirely by the traction-handle in the line A. B. C. fig. 632, the handles of the forceps being left perfectly free and merely held together sufficiently firmly to prevent the blades from slipping, by the India-rubber ring or by tape.

It will be observed that the junction of the two portions of the right rod can never require to be made higher up than about an inch from the vulva and this only when the head is high and the maternal pelvis deep."

1881. Beluzzi.

Beluzzi of Bologne constructed a quite original instrument which combined in one the essential qualities of (1) an ordinary forceps of the Levret type (2) a special forceps adapted for the fœtal breech and (3) a powerful cephalotribe. He replaced the handles of the ordinary forceps by two blades, which has less pronounced curves and are much less wide. This modification enabled the forceps not only to be applied to the breech successfully, without injury to the fœtus, but also to be used as a cephalotribe. (See fig. 633).

1881. M'Vie.

Dr Samuel M'Vie of Chirnside showed before the Obstetrical Society of Edinburgh on Nov. 9, 1881 a pair of

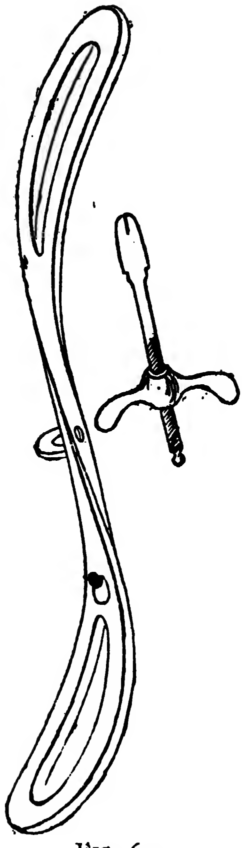


FIG. 633.
Beluzzi's Forceps.
(Poullet).

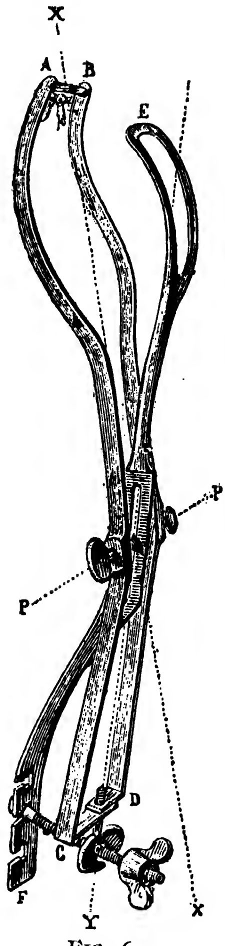


FIG. 634.
Poullet's General Forceps.
(Poullet).

Simpson's forceps to which he added a perineal curve. He claimed the following advantages:—(1) straight traction with a long reach; (2) traction nearer to the axis of the brim than ordinary Simpson forceps; (3) ease and precision of introduction.

"Taking Simpson's "intermediate" forceps to work upon, I have added about two inches to the length of the blades, that is, of the part intervening between the commencement of the cranial curve and the lock. This additional length I have so bent, that with the blade *in situ*, it shall curve round the fourchette and pass backwards over the perineum, until it touches a line prolonged downwards through the traction-axis of the blades. At this point, I have again bent the stem, so that the remaining part of the added length and the handle thereon shall continue in the Axis-Traction line."

Such is the modification. Briefly I have neutralised the pelvic curve by the addition of a perineal curve so that the focus of the resistance lies in the line of traction; and the instrument in this respect becomes practically a straight forceps. Nor is this advantage obtained at any cost except the addition of 1½ inches to the total length of the instrument. The "perineal curve" simply reconfers the power of Axis-Traction which was sacrificed by the adoption of the pelvic curve, and without limiting the range of applicability bestowed by the latter. Therefore in the ordinary "intermediate" forceps, thus modified, we have an instrument of the widest utility endowed with the power of Axis-Traction, suitable wherever forceps are required, except where the obstruction is extremely high; and neither unhandy in the simplest nor inefficient in the most difficult cases. This modification is also valuable since it is equally applicable to the "long" forceps and moreover, it deprives the short straight forceps of the single superiority it possesses." No diagram is available.

1881. Poullet.

Realising the great importance there would be in having an instrument so conformed that it will be possible to grip the fœtal head in any diameter of the pelvis, Poullet constructed what he calls the "general forceps." All the models of forceps that have been used till now are transverse forceps *i.e.*, forceps capable of seizing the head in the transverse diameter of the pelvis only. The forceps of Uytterhoven and

Baumers were constructed for antero-posterior application but unfortunately they have never been applicable on the living woman.

I. The following is the description of the improved model which the author thinks is applicable on the living woman. The author had an imperfect model made many years previously but he did not publish anything on the subject before.

The forceps is sufficiently light and weighs 535 grammes. The branches cross at P. P. (see fig. 634); the one A. B. C. is meant to be placed in the posterior half of the pelvis; the other E. F. is smaller and is meant to be placed in front, in the neighbourhood of the symphysis pubis. The posterior branch consists of two symmetrical stems A. C. and B. D. joined together in three points in the following manner:—

In A. B. by a few centimetres of silk lacing, passed through the aperature, the knot is apparent in the diagram but in reality there is at the extremity, two simple knots, drowned in the thickness of the metal.

In P. P. by two united screws which have at their union, at equal distance of the heads of these two screws, a metallic piece which allows, by means of these screws an angular movement of the branches in the antero-posterior plane.

Finally, in C, D, by the screw Y: the direction Y, Y shows well that the two twin stems of the posterior branch can not get closer or farther from each other except by pivoting around the line Y, Y. This line makes an angle of 20° with the line X, X of the blades.

The screw Y and one of the screws P penetrate into one of the two stems, by a simple aperture and fixes itself by a few turns in the same manner as the pivot of the ordinary forceps, which permits the forceps to articulate and to disarticulate easily.

The diagram shows that the crossing of the branches is not made at a fixed point but that the branch E, F can slip into a groove in which the screw passes P, P serving as a pivot.

In the lower part of the small branch E, F, there are some apertures, where a screw with a movable screw-nut enters, which serves not only to hold the branches close to one another,

after they have adjusted themselves to the head but also to fix the height of the branch E, F, when the degree of slipping has been utilised which is necessary to bring down the occiput. The small branch must always be placed on the side of the pelvis where the occiput lies.

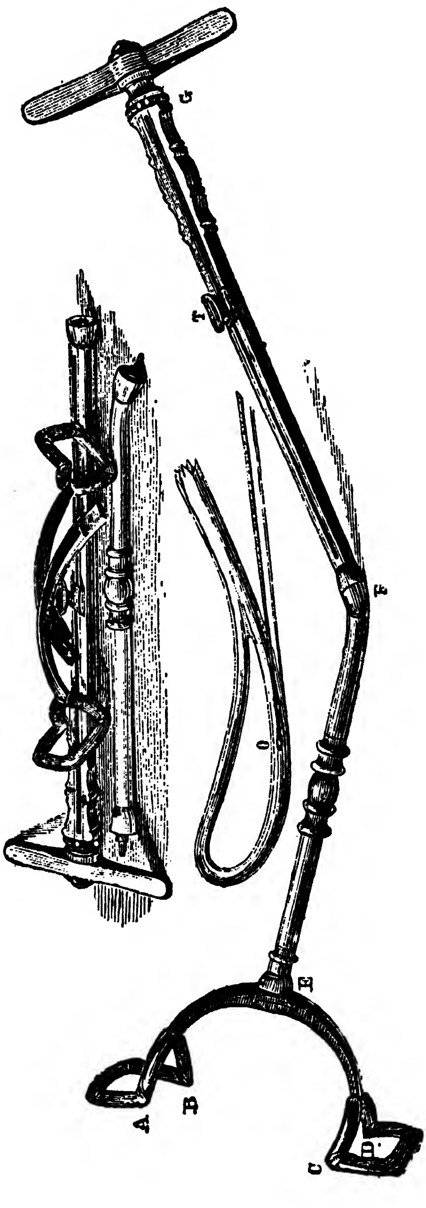
By bringing together the twin stems of the posterior branch, which can not be more than $2\frac{1}{2}$ cm. in width, to oppose it to the small branch, as high up as its groove will permit, an almost symmetric forceps are obtained without any pelvic curve. But as the instrument has very narrow blades, it can be applied transversely, even in contracted pelvis.

The forceps being placed in the above manner either in the transverse diameter or in one of the oblique diameters, the posterior branch should be widened, as much as space permits, before traction is exercised.

This instrument, however, is specially constructed to act directly in an antero-posterior direction like Uytterhoven's forceps. It should be introduced thus:—At first the small branch is placed as an ordinary branch on the side of the pelvis, where the occiput lies, and the branch is made to slide until it is near the symphysis pubis. Then proceed to place the posterior branch, the twin stems of which have been brought together. These get engaged on either side of the handle of the small branch already introduced.

The extremity of this posterior branch is carried on the hand directly to meet the sacro-vertebral angle, without again trying to clear this difficult point. To be able to succeed without removing the inner hand which guides the branch, this is widened by the stretching of the twin stems, the ribband gets stretched to about 3 cm. and the upward movement of the branch is continued, the ribband alone passing between the head and the promontory.

If there is difficulty in introducing the posterior branch, the twin stems could be disjointed by unscrewing the lower screw, and the stems could be pushed in alternately, little by little, as may be possible by the way, the ribband, joining the extremities is arranged.



FIGS. 635-7.
Poullet's Tractor.
Bottom fig. shows the tractor complete.
Middle fig. shows perforation in the posterior rim of the fenestrum for the passage of cord of traction.
Top fig. shows the disarticulated pieces of the apparatus.
(Poullet).

Poullet concludes the description of his general forceps, thus:—"We have not as yet had the opportunity of applying the instrument. It is therefore quite theoretically that we have made this description."

II. In 1875 Poulett described his *mechanical tractor* which was of great service in more than 150 cases in which he has used it. (See figs. 635-7).

Poullet's apparatus is composed of three portions:—(1) A pelvic arc, *a*, *b*, *c*, *d*, (2) A straight rod *e*, *f*. (3) A Canula.

The pelvic arc is terminated at each end by a quadrangular loop covered by rubber and intended to receive the tuberosities of the ischium. The dimensions of the arc are important. From *a* to *c* 3.5 inches, from *b* to *d* 4 inches. The width of the loops from *a* to *b* and from *c* to *d* is 2.7 inches.

The arc is in two pieces, joining and holding firmly the rod at *e*. The instrument may thus be taken apart and the arc increased, where the head is large.

The rod *e f* is straight to *f*, where it bends forward, making an angle at *f* with the canula *gf* of 140.°

The canula *f g* incloses a rod which is moved by turning the transverse handle, and this rod imparts motion to *t*. It is to *t* that the loops of the rods of the forceps, are attached. At the beginning of labour *t* is at *f* at the end of labour *t* is at *g*.

At *o* each blade of the forceps is pierced for the passage of the traction-chains, which are thus inserted (and this is important) at the level of the centre of the fœtal head.

This tractor rests on the pelvis, in front, and behind each tuberosity. These four points, *a*, *b*, *c*, *d*, form a quadrangle, through which pass the traction-cords. The instrument holds the position given it, each turn of the handle simply applying it closer against the pelvis.

The operator is able to alter the axis of the tractor at will. Fig. 638 shows the tractor pulling the forceps, the head at the superior strait. The dotted lines show the position of the instrument at the end of labour.

III. Poullet affirms that while Tarnier's Axis-Traction forceps allows freedom of movement of the head in the vertical and transverse axis, it fails to do so in the anterio-posterior axis.

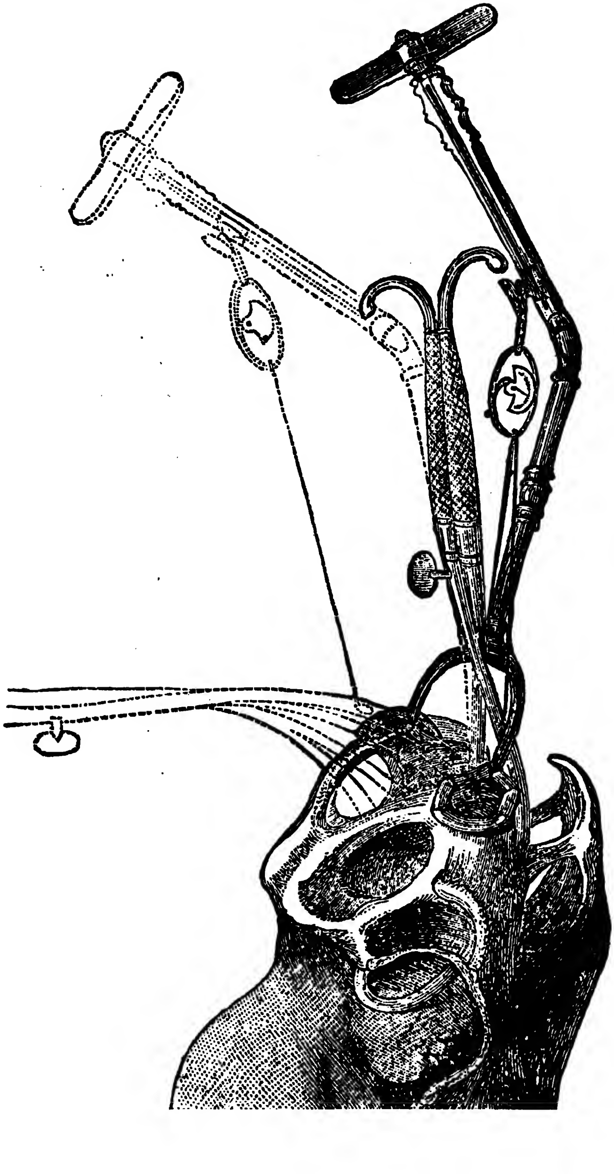
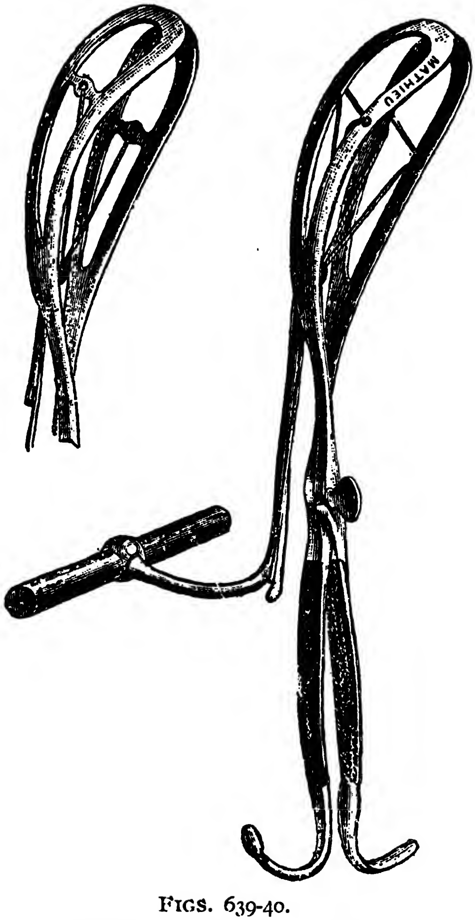


FIG. 638.
Poullet's Tractor.
(Charpentier).

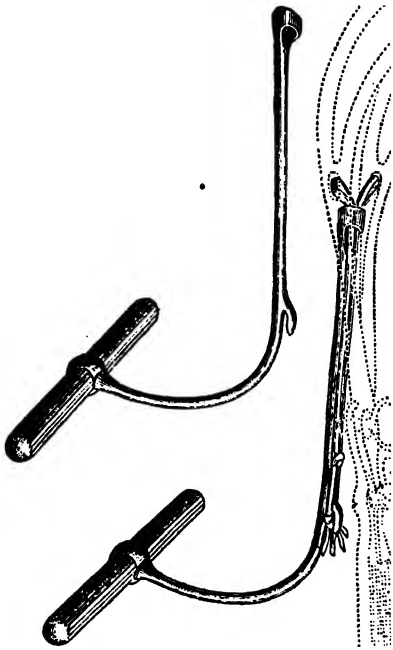
Moreover the instrument is too complicated for use and is difficult to keep it clean. Poullet, neither approves of the cords of Chassagny or of Laroyenne, for Axis-Traction as they cannot be sufficiently drawn back to draw in the axis of the superior



FIGS. 639-40.
Poullet's Axis-traction Forceps.
(Poullet).

strait. Poullet attempted to combine the good qualities of Tarnier's metallic stems of traction and the ribbands of Chassagny. He devised "an independent stem of traction, half supple, half stiff."

Poullet adopted a method of Axis-Traction, in which, he attempted to combine its two main principles—*viz.*, traction in the axis of the pelvis and entire freedom of evolution of the forceps. He observes that Tarnier's instrument exercises



FIGS. 641-2.

FIG. 641.—Poullet's metallic tractor handle.—(Mathieu).

FIG. 642.—Poullet's metallic tractor handle for applying normal traction, as used with Mathieu's forceps.
It can also be employed with any forceps in the blades of which two holes are bored for the introduction of strings of traction. (Mathieu).

traction in the proper direction when direct application is made but fails to do so when obliquely applied. The instrument also fails to achieve the second principle viz. the complete freedom

of the forceps rendered so well by Chassagny's ribbands inserted at the centre of figure. Poullet was of the opinion that the fixed traction-rods of Tarnier's forceps did not allow the necessary degree of freedom to the forceps and adopted Chassagny's ribbands in these place. He, however, retained the movable curved, metallic stem, for traction.

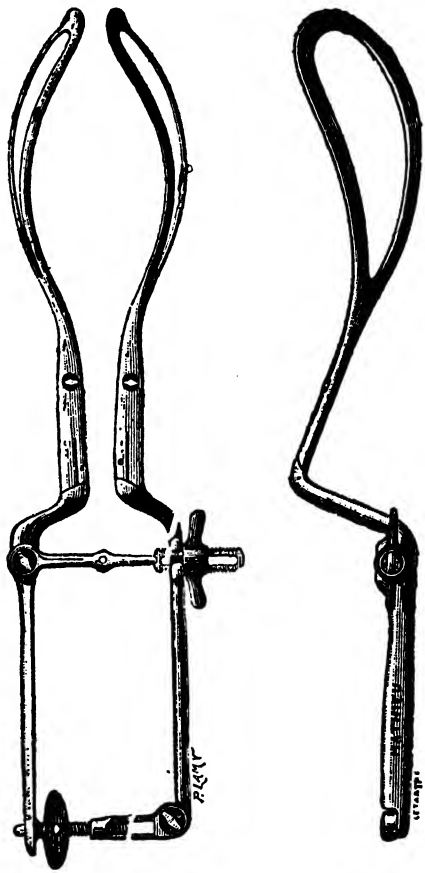


FIG. 643.
Poullet's Forceps.
Parallel and
Angular with
tractor handle.
(Mathieu).

FIG. 644.
Poullet's Forceps.
With disjointable
branches.
(Witkowski).

FIG. 645.
Poullet's Forceps.
One blade, side view.
(Witkowski).

Poullet describes his method of Axis-Traction thus:—This plan adapts itself to any forceps having apertures perforated at the level of the centre of figure. Before exercising traction it will be necessary to tie the handles together unless they are provided with a fixing screw, without compressing the head. A ribband is passed through the holes of each branch.

The handle is a straight stem of steel, 15 cm. long, then bent at right angle and continued by an arched portion about 10 cm. long. It carries at its extremity a small movable rod for traction as in Tarnier's instrument. This elbowed stem presents the following two arrangements:—(1). The free extremity (*i.e.*, the extremity which penetrates in the vagina), is terminated by an olivary enlargement pierced with a hole like a serre-nœud for the passage of the ribbands.

(2) The bend of the stem presents a small prolongation backwards, to fix the ends of the ribbands, which will be simply put astride in the depression under the tenon. This depression serves as a pulley for the ribbands. The ends of the ribbands by which traction is to be made are passed through the hole at the extremity of the stem, which is pushed into the vagina until the tip is within 1 or 2 cm. of the fœtal head. The traction end of the ribbands is placed across the bent part of the stem and traction applied on the small cross piece handle. If mechanical traction is to be employed, the mechanical tractor can be hooked on. (See figs. 639-40). Figs. 641 and 642 show the tractor handle of Poullet applied for traction in Mathieu's special forceps.

IV. Poullet also constructed an angular parallel forceps with tractor-handle (1887). (See figs. 643-5).

1882(?) Howard.

William Travis Howard was born in Cumberland County, Virginia, January 12, 1821. In 1842 he entered Jefferson Medical College and graduated in 1844. After graduating he settled in Warren County North Carolina, where he practised general medicine for several years. In 1866 he removed to Baltimore and was appointed Adjunct to the Chair of Physiology

in the University of Maryland; but in January, 1867, this institution created for him a Chair of Diseases of Women, which he filled for 30 years. He was appointed a visiting surgeon of the Hospital for the women of Maryland, which position he held until his death. He was not a voluminous writer but made some contributions to medical literature. He was the first American surgeon to make use of Tarnier's forceps and invented a modification of that instrument. No description or illustration of his instrument is available. He died, after a few days illness, from the effects of ptomain poisoning, at Narragansett Pier, July 31, 1907 at the age of 86.

His Axis-Traction forceps is mentioned in Tiemann's catalogue, and is alluded to by Prof. Simpson in his paper read before the Edinburgh Obstetrical Society on July 11, 1883. Professor Howard clearly recognised and fittingly stated that the "fixation-screw" was really a "regulation screw" perventing the justly dreaded danger of over-compression of the head.

1882. Giordano.

The following description appears in New Sydenham Society's Lexicon:—"Both halves are perforated at the base for the reception of the hinge which is a separate and detached piece when the blades are desired to be used together, it is attached by means of a male screw, which works into a female screw." See Casale.

1882. Grainger.

W. H. Grainger constructed a new obstetric forceps for operation at the superior strait.

1882. Studley.

W. H. Studley, of New York, being struck with the uselessness and danger of the traction rods of Tarnier's forceps, devised a new forceps, based on the following ideas and principles.

"Conceive of the blades of the ordinary forceps to be curved up or rather bent up on their shanks, so that an average

line of the blade and the bend shall be at an angle to the line of the handles of about 45 degrees—then conceive of a backward or downward bend of the shanks at about the middle, or at such a point as will make the line of the handles perfectly parallel to the longitudinal line of the blades and 2 inches from it. In this double bend you get a perineal curve of exact dimensions, the special object of which is, besides the non-interference with the perineum, to enable the line of the handles, when brought in coincidence with the pubic plane, to indicate that the axis line of the blades is in coincidence with the axis of the superior strait. It has already been shown that the plane of the pubes, is at right angles to the plane of the brim or superior strait and hence must be parallel to the axis of that strait. It is only necessary therefore, with such a constructed forceps, on applying them to the head any where above the pelvic floor, to bring the handles to the plane of the pubes

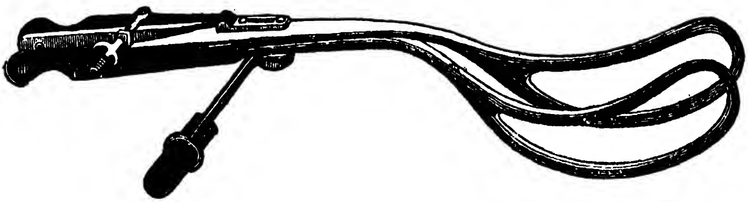


Fig. 646.
Studley's Forceps.
(Amer. J. Med. Sci. Jan. 1882, 103).

(which is parallel to the general vulvar plane), in order to positively direct the blades in the axial line of the brim. Now it is the easiest thing possible to determine the general plane of the pubes, all that is necessary, is to place the index finger on the upper edge and the thumb on the under edge of the pubes, and its plane is seen at a glance. The other and distinguishing feature of my forceps, is a shaft adjustable to a button, on the under end of the lock-post descending obliquely to the traction line, which is only a prolongation of the axial line of the blades, and terminating in a ring through which is passed transversely a wooden handle, similar to, but shorter than that of Tarnier's. No one can dispute the advantage of

such a handle, both as regards the economy of strength to be laid out and the efficiency of traction to be made, for by it traction can be made on the blades just as they should be made, *viz.*, in a line with their axis and that of the pelvic axis, without at all disturbing the perineum or being disturbed by it, thus making them virtually a straight forceps with all of their acknowledged advantages. Although the lock is peculiar and of easy adjustment, yet no special claim is made for advantages over those of other forceps. There are some features of the blades and shanks which differ from those of the generality of forceps, and which I claim should enter into the principles of forceps-construction:—

1. The blades are of more than the ordinary width and possess a more decided concavity, both transversely and longitudinally. They are therefore enabled to grasp the head with a hug which is distributed generally and evenly over the cranial surface, from their tips to their junction with the shanks by which means an undue pressure on any one point is avoided, an upward or downward tendency to glide from the cranial convexity is prevented, their central rotary action on the sides of the head as pivotal points is guarded against and lastly the muscular perception is greatly conduced to by the firmer bearing of the handle indicating thereby the course which the head is naturally pursuing.

2. The proximal ends of the blades and the shanks are stiffer than the great majority of forceps. They are such as to allow of almost no separation, within the bounds of any reasonable traction. Limber forceps slip off and bruise the head and lacerate the perineum.

The binding screw is, in all essential respects, the same as Tarnier's.

1882. Breus.

C. Breus, assistant of G. Braun published a description of the forceps which he constructed in accordance with the views of his professor. The forceps of Breus, is an elegant instrument, light, and less complicated than that of Tarnier; but the traction

approaches less to the aim in view, *i.e.*, to the axis of the superior strait.

At the point at which Tarnier articulates the traction-rods, Breus has cut each branch into two parts—the blade and handle. These are strongly reunited by an articulation with a horizontal pivot, allowing an up and down movement of the hinge.

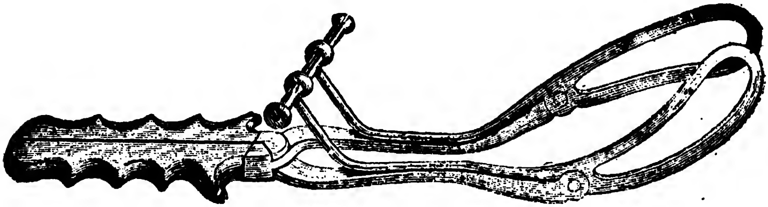


Fig. 647.
Breus's Forceps.
(Poullet).

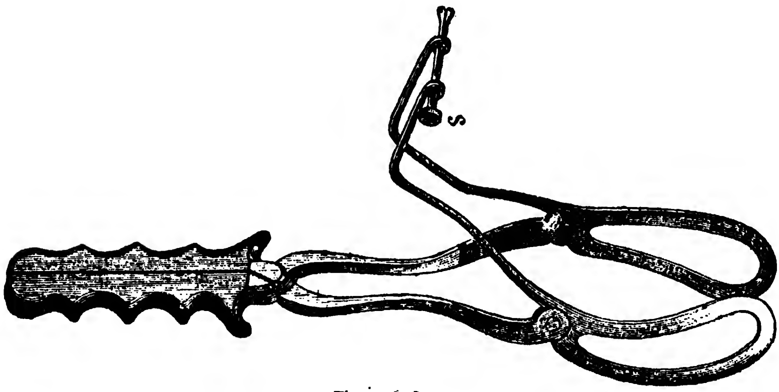


Fig. 648.
Breus's Forceps.
Handles carried backwards.
(Poullet).

"The instrument is modelled after the popular Simpson forceps but differs from it as follows:—Five inches distant from the lock and three inches from the beginning of the cephalic curve, is situated a hinge-joint which permits the upper five inches of each blade to move in an antero-posterior

direction. The portion of the blade above this joint *i.e.*, the movable portion includes the greater part of the cephalic and all the pelvic curve. Most of the measurements are greater than in Simpson's instrument.

Commencing at the hinge-joint two thin spur-like processes are continued downwards from the upper movable blades upon and parallel with the instrument, almost to the lock; here they curve upwards at a slightly obtuse angle and end, two and a half inches from the shanks by ring extremities. A connecting pin passes through these rings." (See figs. 647-8).

References:—Dickinson, Fry, Furst, Parker, Parisheff, and Petrider.

1882. Macdonald.

Dr. A. Drummond Macdonald of Liverpool designed a new Axis-Traction forceps, the leading points in the design of the instrument being: (1) Axis-Traction without the use of intra-vaginal rods; (2) indication of the grasp taken of the fœtal head; (3) portability and (4) minor deviations from the ordinary type of long forceps, partly suited to the three preceding points, partly by way of improvements.

The blades are $6\frac{5}{8}$ ins. long, $2\frac{7}{8}$ ins. apart at the widest and 1 in. apart at their extremities which are not quite so broad as usual. When applied and traction made, they will give half an inch, a point to be observed in all forceps, according to the temper of the steel and having an important bearing on the question of grasp. The total breadth is $1\frac{3}{4}$ in. the fenestrum being $\frac{7}{8}$ in. leaving $\frac{7}{16}$ in. steel which ensures a good hold. The fenestrated portion has been made nearly straight and the pelvic curve lies in the lower portion of the blade and upper part of the shank, for the reason that when the blades are in apposition to the head at or entering the pelvic brim, the natural curve of the genital canal lies below the head, consequently below the blades and so corresponds to the curve above indicated.

The shank measures $2\frac{5}{8}$ ins. (with the blade $9\frac{1}{4}$ ins.). This should prevent any locking in the vagina.

The lock is a kind of hybrid between the British and the Continental locks and allows of a scissors-action of the blades for the purpose of indication mentioned below. The lower blade has and is easily recognised by, a hooked portion of the lock, on which the upper rounded and shielded segment is slipped in locking.

The handles have upper movable halves attached to the lower by a hinge-joint which admits of their being folded down from right angles, so as to be easier of manipulation when required and occupy smaller space when not in use. There are holes for a transverse traction-bar through their ends, between which is a space for the middle finger to be passed through when grasping this bar.

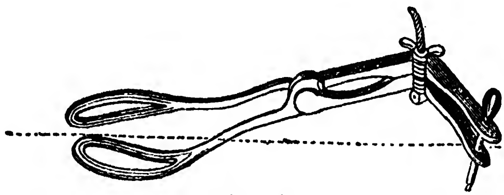


FIG. 649.
Macdonald's Forceps.
(Lancet 1882, *ii*).

The indicator is seen as a scale on the flat convex side of the binding screw passing through the centre of the hinge and shows how far the extremities of the blades when in position, are apart, within a range of one to three inches. This will indicate whether a sufficient grasp has been obtained to avoid risk of slipping; and if the exact presentation and movement be taken into account, will give an idea of the measurement of the diameter of the head we are dealing with. For portability's sake the traction-bar may be screwed into the head of the binding screw.

Mode of application. Insert the screw and read off its index number, raise the movable part of the handles and place in position the tranverse bar. If the head is at the brim traction is to be commenced with the bar opposite the tip of the coccyx so that the line of traction shall pass through the

axis of the brim. As the head descends the hands are to be moved forwards.

The forceps are dark bronzed to take away the formidable aspect that bright polished or plated instruments wear in the eyes of outsiders. This is an "instrument of precision."

1882. Bartlett.

The forceps blade director; an instrument intended to facilitate under certain conditions, the introduction of the blades of the obstetrical forceps.

1883. Crouzat.

Crouzat described a tractor which could be attached to the classic forceps at will.

Richard C. Norris in his review on the modern Obstetrical Forceps in the Progressive Medicine for 1903 says that of the recent modifications of the Tarnier's Axis-Traction forceps, the most important one is that of Crouzat of Toulousse.

"This forceps has a pelvic as well as a vaginal curve and an Axis-Traction handle. The pelvic curve begins between the blades and lock so that this instrument can also be used as a straight forceps inasmuch as the blades are straight. The lock is permanently secured by a simple screw. Thence the arms of the forceps bend almost at right angles downward and again at right angles parallel to the blades. In this last bend is a groove in which plays the compression-screw. The handle is attached to this screw on a very movable joint. The greater the traction the greater the compression of the head, as the screw slides in the groove with the traction and pulls the arms of the forceps together as it does so. The force of compression is therefore automatically proportionate to the force of traction —a very desirable feature. The handle is provided with an indicator needle that points to another needle in the compression-screw. When these needles are opposite to each other the Axis-Traction is correct." (See Maygrier and Schwab).

1883. Parsons.

Dr. Stovell C. Parsons had the unfortunate experience of the forceps slipping when the instrument was used to deliver premature babies. To overcome the difficulty he constructed a special instrument and observed: "Dr. Brickel's being about the only one of any merit, are excellent where the head is in the inferior strait but in the superior they are at times applied with great difficulty on account of the handles being comparatively straight or without the pelvic or cradle curve, as used by Dr. Sawyer of Chicago. On being applied and tension made, the power is exerted in the line of the axis of the superior plane, thus forcing the head against the pubis and retarding instead of aiding delivery. As before stated, tension being made the blades do not hold securely on account of their having a slight outward flare at the tip, thus weakening them where the greatest power of assistance is required. To obviate these difficulties, I have continued the original curve of the fenestra inward to the tip

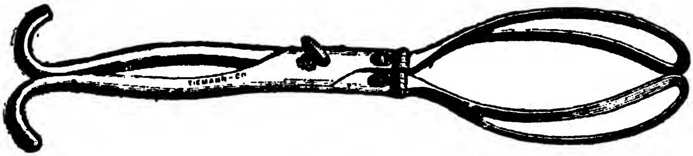


Fig. 650.
McFerran's Forceps.
(Tiemann).

so that the power of resistance is equal throughout the entire blade and the head once fairly inserted within it, it is impossible for it to slip except by breaking or bending in consequence of poor material. The handles I give the cradle or pelvic curve thus enabling the operator to introduce the same with less difficulty and exert all tension or force in the line of the axis of the pelvic canal. The forceps weigh 242 grammes."

1884. McFerran.

He devised an instrument simply to overcome the difficulties of high pelvic application. This forceps is alluded to in Hoffman's paper on Axis-Traction forceps in the Transactions of A.A. of O. & G. vol. iii, 1891, page 56.

1884. Macdonald.

Dr. Angus Macdonald showed before the Obstetrical Society, of Edinburgh on July 16, 1884 a modification of Tarnier's Axis-Traction forceps. The speciality in the modification consisted in the fact that the rods were removable so that the instrument could be used either with or without them. They were shorter than the rods of Professor Simpson's pattern and for that reason less in the way during introduction of the blades and entirely out of the way when locking. The Tarnier bolt had been retained for attaching the traction-handle after application.

1884. Connel.

Dr. John Connel of Peebles showed a pair of Axis-Traction forceps with detachable traction-rods, before the Obstetrical Society of Edinburgh on May 14, 1884. He claimed for them the advantage of perfect cleanliness and also that the rods being removable, the instrument could be employed either as an ordinary pair of forceps or as an Axis-Traction forceps.

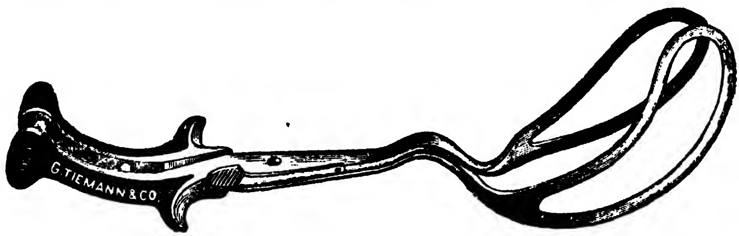


FIG. 651.
Schuyler's Forceps.
(Tiemann).

1884. Schuyler.

W. D. Schuyler, constructed a new obstetric forceps. No description is available. (See fig. 651).

1885. Jewett.

Charles Jewett was born in Bath, Maine, September 27, 1839. He began the study of Medicine in 1867 and received

the degree of M.D. from the College of Physicians and Surgeons of New York in 1871. In 1880 he was appointed Professor of Obstetrics in the Long Island College Hospital which chair he held until 1898, when upon the death of the late A. J. C. Skene in 1890, he became Professor of Obstetrics and Gynecology in the same institution, a position which he held until the time of his death. During his years of activity in his special field he was connected at one time or another as Attending or Consulting Surgeon, with many of the large hospitals of Brooklyn. His publications were numerous and valuable. He died after a very brief illness from the effects of a cerebral haemorrhage on August 6, 1910.

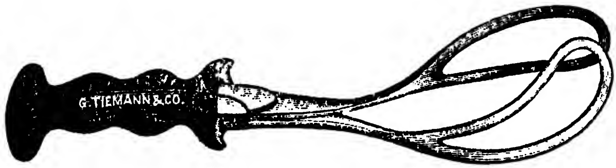


FIG. 652.
Jewett's Forceps.
(Tiemann).

In his "Notes on Hospital Obstetrics" he describes his forceps thus:—

"I submit a forceps which is designed to meet the requirements of modern obstetrics in the matter of cleanliness. The only important new feature is the construction of the handles, which are of hard rubber, smoothly polished, and they wholly envelope the metal. As the rubber is vulcanized upon the metal, there are no crevices for the lodgment of filth. With the exception of the handles, the general model of the instrument is similar to the Elliot forceps but the shanks are stronger and the lock is a half Smellie." (See fig. 652).

1884. Partridge.

E. L. Partridge presented before the Obstetrical Society of New York at their meeting, on 2nd December 1884, "an obstetrical forceps which resembled that of Dr. Alexander

S. Hunter in the manner in which the handles of the instrument were locked and in general form that of Dr. Garland of Boston. The object of the instrument was to meet the needs of a certain class of obstetrical cases in which it was not convenient to make use of a forceps with long handles. The blades of the instrument were nearly as long as those of the ordinary forceps but were lighter, the oval was more marked, and the handles were much shorter and

FIGS. 653-6.
Neale's Axis-traction Forceps.
(Amer. Jour. of Obs. XVIII).

were firmly locked when grasped by the hand of the operator, so as to preclude the possibility of slipping and of compression of the cranial bones."

1885. Neale.

L. E. Neale, chief of the Obstetrical Clinic and Demonstrator of Obstetrics in the University of Maryland, constructed an obstetric forceps which he described thus:—"I have

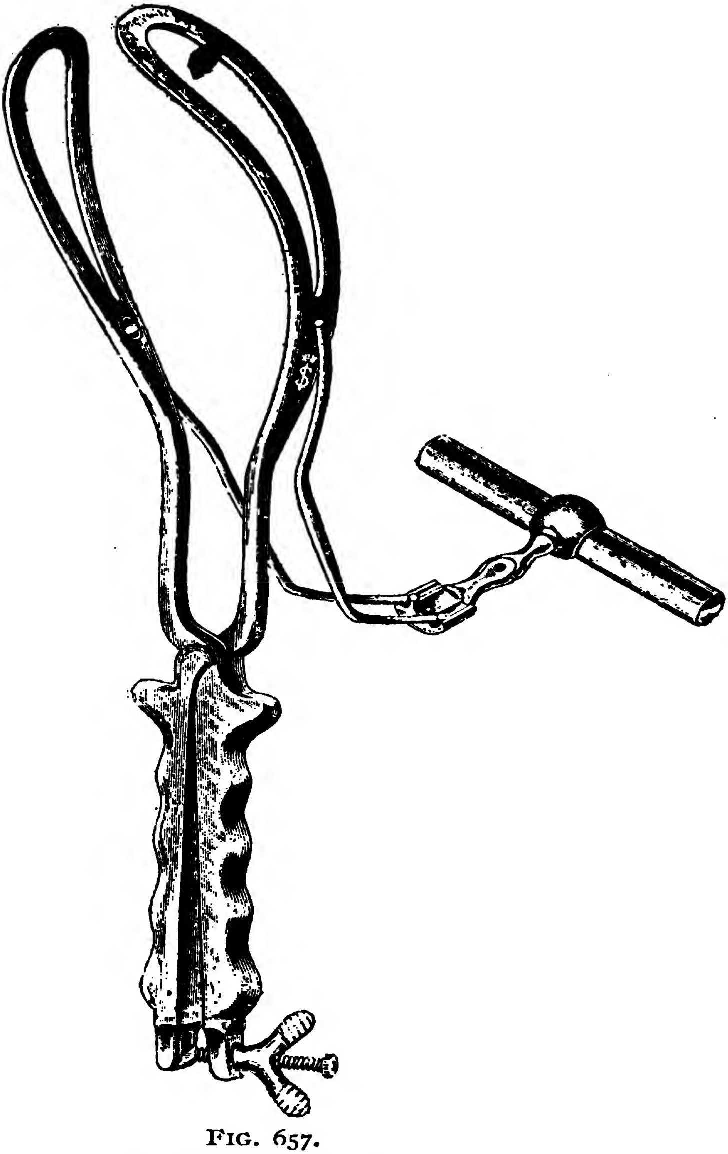


FIG. 657.
Felsenreich's Forceps.
(Jetter and Scheerer).

designed an instrument representing the Simpson forceps practically unaltered, capable of being combined at option with the Tarnier attachment. The following is an illustrated description:—

1. A practically unaltered Simpson forceps.

2. The button-hole perforations, one behind each fenestra, into which traction-rods are inserted and maintained by the button on the ends of the rods.

3. A removable compression thumb-screw which sinks into a groove made in the extremities of the handles of the Simpson forceps.

4. The hard rubber handle for the traction-rods like Tarnier's, in which handle is concealed a sliding bar, to be used at option, so as to render the swivel-joint immovable.

The instrument combines in the least complex and most practical manner, the two principal forceps of the present day *viz.*, the Simpson and the Tarnier, giving us either one or both in the same forceps, as desired."

In a supplementary communication two months later Neale stated:—"My combination forceps has, I believe, decidedly been improved by modelling the blades after the Simpson-Tarnier pattern, which possesses greater cephalic and pelvic curves, is much stronger and far less liable to feather or slip than the ordinary Simpson."

1885. Ruth.

C. E. Ruth devised a new attachment to obstetrical forceps.

1885. Felsenreich.

Felsenreich's modification of Alexander Simpson's Axis-Traction forceps consists of the following parts:—

1. A practically unaltered model of Sir James Y. Simpson's forceps.

2. Button-hole perforations one behind each fenestra, into which traction-rods are inserted and maintained by the buttons on the ends of the rods.

3. A removable compression thumb-screw, which sinks into a groove made in the extremities of the handles of the Simpson's forceps.

4. A hard rubber handle for the traction-rods. The arrangement for the insertion of the traction-rods into the hard-rubber handles differs from the mechanisms in Tarnier's and Alexander Simpson's Axis-Traction forceps.

1885(?) Parvin.

. Theophilus Parvin was born in Buenos Ayres on January 9, 1829. His mother died when he was only two or three weeks old, and his father died when he was about 7 years of age. He received the degree of A. B. in 1847 from the State University of Indiana. Young Parvin then taught in the Lawrenceville High School, New Jersey, until 1850. In 1852 he received the degree of M.D. from the University of Pennsylvania. Then he became resident physician at the Wills Eye Hospital in Philadelphia. In 1864 he was elected Professor of Materia Medica in the Ohio Medical College of Cincinnati. In 1869 he became Professor of Obstetrics in the University of Louisville. In 1876 he was elected Professor of Obstetrics in the College of Physicians and Surgeons of Indianapolis. In 1878 he became Professor of Obstetrics in the Medical College of Indiana. In 1882 he was recalled to the chair in the University of Louisville. In 1883 he accepted the professorship of Obstetrics in the Jefferson Medical College at Philadelphia. For several years he was Obstetrician to the Philadelphia Hospital.

His communications to various medical journals and scientific papers and addresses submitted before different medical societies were very numerous and varied. His book on "obstetrics" teemed with the characteristics of the man. It evinced the exact yet fluent writer, the painstaking and talented investigator. He died in 1898.

For an appreciation of the life and work of Parvin see Dr. Mosher's presidential address on "The Apostle of Casuistry in Medicine—An Idealization of Theophilus

Parvin" delivered before the annual meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons held in 1926 and published in the American Journal of Obstetrics and Gynecology of April 1927. For an illustration of his forceps, see fig. 658.

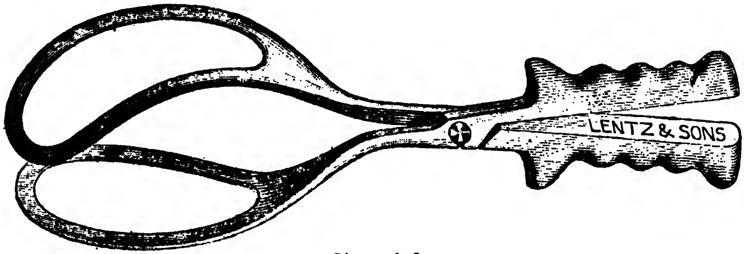


FIG. 658.
Parvin's Forceps.
(Ch. Lentz and Sons).

1885. Davies.

The size of the forceps of J. Davies is between the very long and the very short forceps. "The blades are 6 ins. long nicely curved, with a shank 1½ in. in length. The middle of

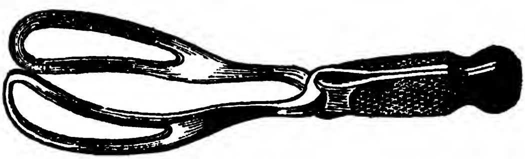


FIG. 659.
Davies's Forceps.
(Lancet. 1885, *ii*).

the blades at the widest part (outside measurement) is 1½ in. in width; between the blades at the widest part is 3 ins.; at the extremity ⅞ in. The interior measurement between the shanks is ⅞ in. The handles are 5½ ins. long and are roughened; the edges of the blades are nicely rounded." (See fig. 659).

1885(?) Matos.

Dr. Lloranti Matos constructed a small vulvar forceps which was manufactured by Mathieu, the surgical instrument-maker of Paris. (See fig. 660).

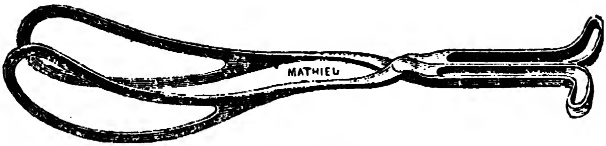


FIG. 660.
Matos's Forceps.
(Mathieu).

1885(?) Bowers.

Bowers's forceps is mentioned in Weiss's catalogue (1901). No description or diagram is available.

1885(?) Hunter.

James Bradbridge Hunter graduated at the College of Physicians and Surgeons of New York and then pursued a course of study abroad, his intention being to become an ophthalmologist. On returning to New York he became an

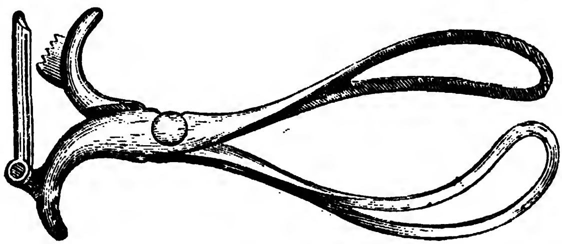


FIG. 661.
Hunter's Forceps.
(Tiemann).

interne in the Woman's Hospital, a step which changed the entire current of his life. His published articles were comparatively few. Possessing considerable mechanical skill, he devised a number of useful instruments and appliances. He was a Fellow of the American Gynecological Society. He died

in 1889, almost in the prime of life. For an illustration of his forceps, see fig. 661.

1885(?) Cameron.

In an old edition of Down Bros.' surgical instrument catalogue, is mentioned a midwifery forceps by Dr. Cameron of Montreal. It is described as a Barnes' instrument with Simpson's handles. No illustration is given.

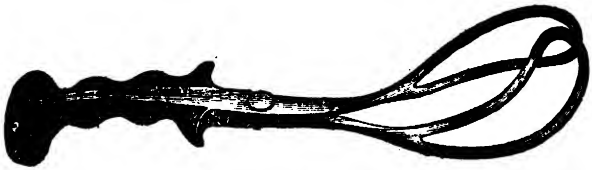


FIG. 662.
Rockwell's Forceps.
(Tiemann).

1885(?) Rockwell.

For an illustration of this forceps, see fig. 662.

1885(?) Robinson.

For an illustration of this forceps, see fig. 663.

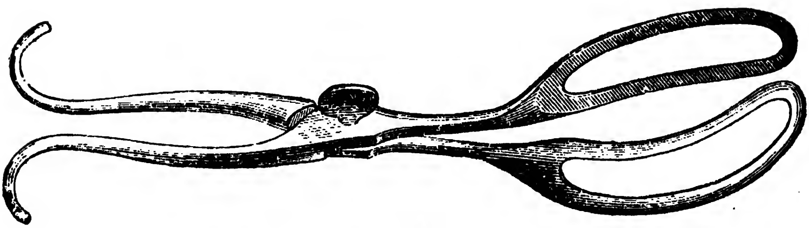


FIG. 663.
Robinson's Forceps.
(Tiemann).

1885(?) Pierce.

Pierce's forceps is mentioned in Tiemann's catalogue but is not illustrated therein.

•1885(?) Trueheart.

For an illustration of this forceps, see fig. 664.

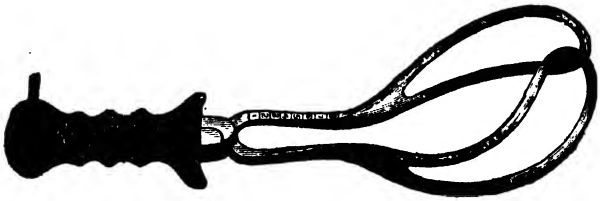


FIG. 664.
Trueheart's Forceps.
(Tiemann).

1885(?) Thomas.

For an illustration of this forceps, see fig. 665.

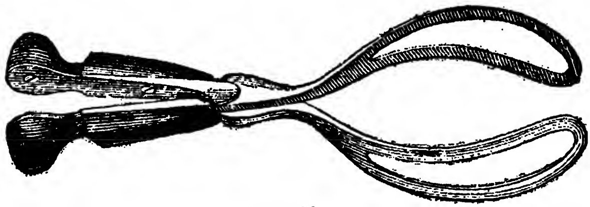


FIG. 665.
Thomas's Forceps.
(Tiemann).

1885(?) Tucker.

The peculiar features of the Tucker-Mclean forceps are its short thanks and solid blades. (See fig. 666).

FIG. 666.
Tucker-McLean's Forceps.
(Reid Bros.)

1886. Stone.

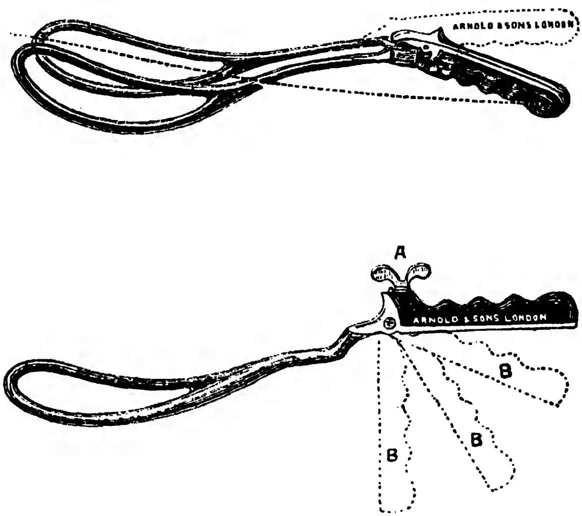
Alexander Johnson Stone was born in Augusta, Maine, September 7, 1845. He graduated in medicine from Berkshire Medical College, Pittsfield Massachusets, in 1867. After spending a few months abroad, chiefly in Paris, he returned to Boston where he served as an assistant of Horatio R. Storer for about a year, during which he received special training in the then rapidly developing specialty of gynecology. Coming to Minnesota, sometime in 1868, he first settled in Stillwater, where he engaged in general practice. But his cherished ambition to practise his chosen specialty made him remove to St. Paul in 1870. He was the pioneer of medical teaching in the North-West, having organised the St. Paul Medical College in 1879. From this time on he was identified with practically every venture in medical teaching in the Twin Cities upto the establishment of the College of Medicine of the University in 1888. In this school he ably filled the chair of diseases of women from its organization to the time of his death on July 16, 1910. He loved to teach, and was a fluent speaker, with ability to impart knowledge in an interesting and impressive manner.

At the meeting of the Gynecological Society of Chicago, held on 19th March, 1886, Dr. Jaggard called attention to Stone's pelvic-outlet forceps. "The characters of the instrument are: Length 24 cm. (spoons 14 cm., handles 10 cm.). Fenestra length 12 cm., width 3.5 cm., cephalic curve, 8 cm., weight 210 grams. English lock. The instrument is bent backwards on its long axis, so that the angle, at the junction of the spoons and handles, is about 160°. The object of the perineal bend is to maintain flexion of the head during its passage through the vulvar orifice."

1886. MacMunn.

James MacMunn proposed the following modifications. Fig. 667 shows the handles bent back to meet the line of axis running through the fenestrae and by so doing dispenses with the aid of a traction force applied to the blades. Such a bend

makes the instrument also easy of introduction and keeps the handles in proper place when introduced. Fig. 668 shows the chief advantage I claim for the instrument, *viz.*, the presence of a screw hinge on the upper blade which will make it easy of application and fulfil an indication for which there is no provision at present made, *i.e.*, the adaptation of the space between the blades to the varying size of the child's head.



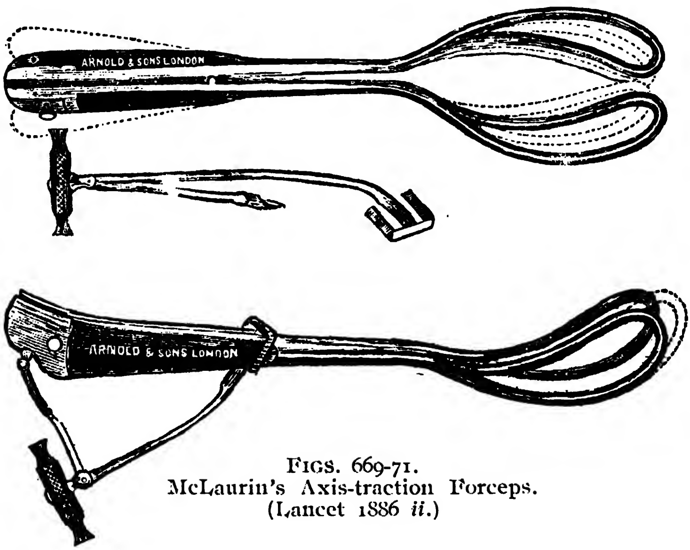
FIGS. 667-8.
MacMunn's Forceps.
(Arnold and Sons).

1886. McLaurin.

W. McLaurin of Barnsbury devised an Axis-Traction midwifery forceps with sliding blades, with the object of increasing the adaptability of the blades to the fœtal head and of securing axis-traction by as simple a mechanism as possible. (See figs. 669-71).

The illustrations afford a good idea of the instrument but on an exact side view, the blades do not appear to join the stems at an angle and the handles are seen to be slightly recurved at the lock. Longitudinal, somewhat circular sliding

movement is provided for and controlled by two pins in the one handle and corresponding grooves in the other. The proximal pin, working as a screw, can be varied in length and determines the span of the blades. Locking is effected by a separate piece and the Axis-Tractor easily applied after the introduction of the blades, which it unites rigidly together under the simple operation of tractive force applied to its handle whilst between the pains it can be unshipped at will by a slight push. Owing to the length of the stems, the lock is always quite outside the vulva. There is no screwing



FIGS. 669-71.
McLaurin's Axis-traction Forceps.
(Lancet 1886 *ii.*)

together of the handles and the head can be relieved of pressure by a turn or two of the proximal pin or by undoing the lock. One hand on the handle of the tractor commands the whole instrument.

1886. Braun.

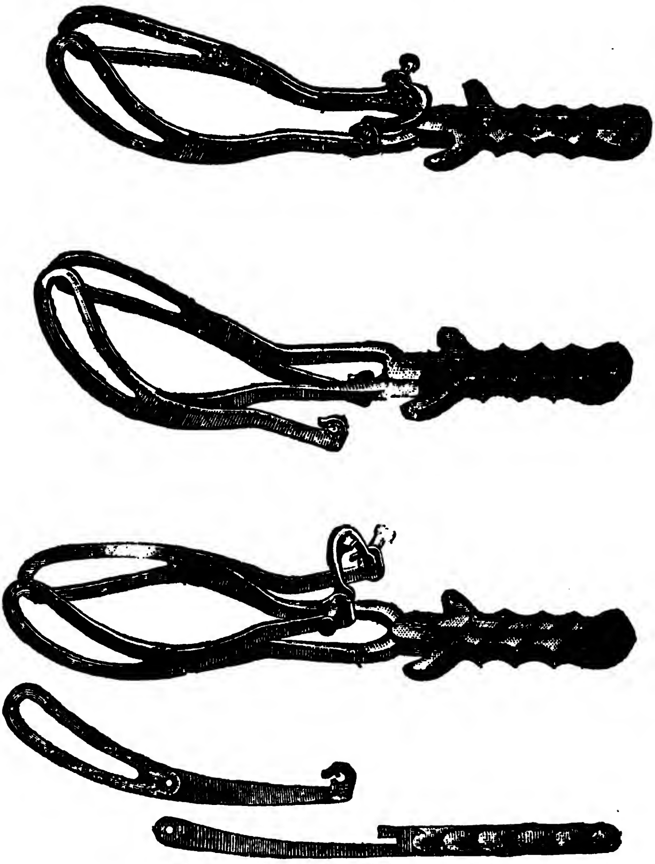
Carl Rudolf Ritter Braun von Fernwald was born on March 22nd, 1823, at Zistersdorf, a little town 32 miles north-east of Vienna. In 1841 he entered the University of Vienna and in 1847 he took his doctor's degree. In 1849 he succeeded

Semmelweiss as assistant in the Obstetric Clinic under Professor Klein. In 1853 he became a privat-docent and in the same year he was appointed Professor of Obstetrics and Vice-Director of the School for Midwives at Trent, in the Austrian Tyrol. In 1856 on the death of Klein, he was called back to Vienna as Professor of Midwifery in the University and Director of the Obstetric Clinic. He continued in this post until his death which took place on March 28th, 1891.

He received decorations from the sovereigns of several foreign countries and honorary degrees and distinctions from universities and scientific societies in Great Britain, America, Italy, Russia, Austria and Germany. He continued actively engaged in scientific work to within less than six weeks of his death. He was noted as an excellent writer and was the author of a large number of books, monographs, and articles in medical journals. He displayed much mechanical ingenuity in devising and in modifying several obstetrical and gynecological instruments. He describes his modification of Simpson's forceps, in his "Lehrbuch der gesammten Gynaekologie." This instrument is frequently used in Germany. He approximated the points of the blades from 1¼ in. to slightly less than an inch and he increased the greatest distance between the blades by about 1/7 in. He increased the pelvic curve. He retained the Smellie or English lock. He also described and figured under the name "Forceps Trimorpha" an Axis-Traction forceps, which he contrived for easy introduction.

Braun has modified Simpson's forceps. His "triform" forceps is 36 cm. long, the blades being 22 cm. At the lower angle of each fenestra are perforations where the handles are attached making a double axis movable joint. The articulation is a perfect one and the screws at the joints easily removable for cleansing. The hooks at the ends of the fenestræ handles are for the insertion of stirrup-shaped metallic plate which serves to fix the blades. The instrument when used as in Fig. 672, is practically an unaltered Simpson and may be used in typical forceps cases. Where high forceps are indicated, owing to the movable joints, the pelvic curve of the instrument may be altered from 7 to 10 cm. during the

adaptation of the instrument and later during traction, this curve may be reduced at will. The increase in pelvic curvature of the instrument is gained by (fig. 674) linking the fenestræ handles under the lock. (It is sufficiently suggestive from the cut how the pelvic curve of the instrument may be altered at



FIGS. 672-5.
Braun's Triform Forceps.
(Wien. Med. Woch. 1886).

will by lifting the fenestræ handles above or below the lock). After use the instrument may be taken apart by removal of the two screws which articulate the fenestræ to the handles, and carefully cleansed.

Breus's instrument resembles in all essential particulars Carl Braun's forceps, without some of its apparent advantages so far as cleanliness is concerned.

As will be readily seen both instruments must fail in the high application. Two apparent advantages possessed by the Breus are its lightness and the possibility of its being applied in oblique positions, owing to the joint in the blades which allows the locking of the instrument when they are not parallel. Neither instrument, however, fulfils the complete idea of Axis-Traction.

1886. Wells.

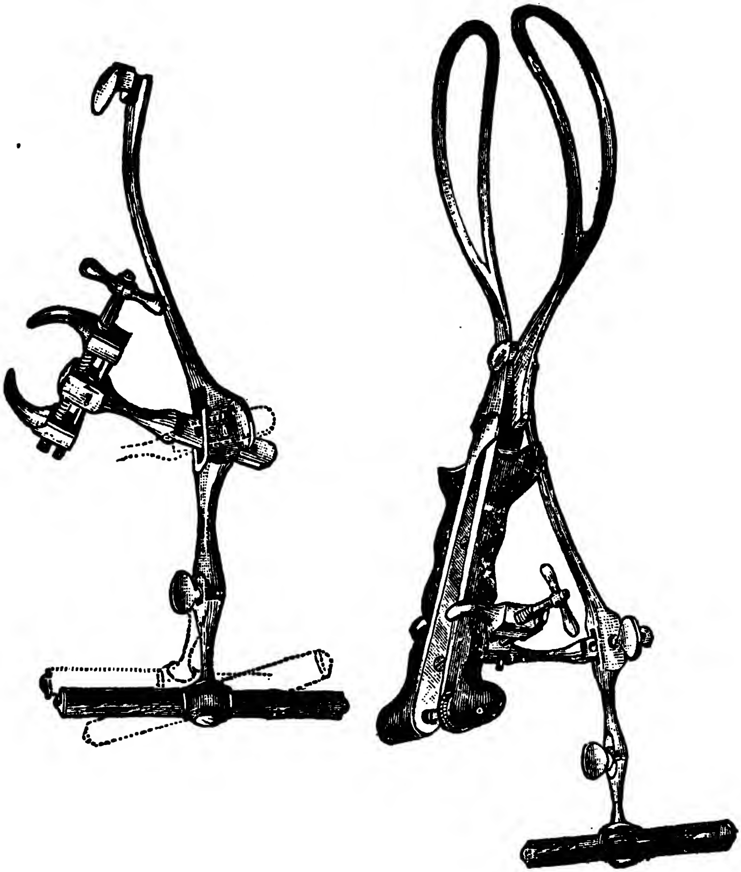
Brooks Hughes Wells was born July 28, 1859. He was graduated from the College of Physicians and Surgeons of New York in the class of 1884 and served his internship at the City Hospital on Blackwell's island. For many years he was Professor of Gynecology at the New York Polyclinic Medical School. Dr. Wells was perhaps best known by his long association with the American Journal of Obstetrics, of which he became the editor in 1892. He met an untimely end as the result of an accident on July 4, 1917. Devoted to riding the wheel, he was thrown from the same at his country home and sustained a compound fracture of the skull, which proved fatal two days later.

He devised a traction-rod which was applicable to an ordinary pair of forceps. It seems to possess the properties of the Tarnier instrument and fulfils the purpose of an Axis-Tractor.

It consisted essentially of a traction-rod, at the end of which was a notched hook, which fitted into the angle made by the divergence of the blades and was provided with a transverse handle. From this rod arose a movable arm with a clamp which grasped firmly the handles of the forceps and held them at any desired distance from the traction-rod, thus allowing the line of traction to be adjusted to the varying pelvic curves of different forceps.

1886. Holland.

Edmund Holland constructed an Axis-Traction forceps which "has for its object the simplification of the high delivery, and a greater control over axial direction. It has



FIGS. 676-7.
Well's Axis-traction Attachment.
(Amer. Jour. of Obs. XIX).

the double curve, after the manner of Dr. Aveling's instruments, and their chief peculiarity attaches itself to the small metallic handle, which slips on the wooden handle of the upper blade, and is capable of easy circular rotation to

the left or right. When in operation, this supplementary handle (*b*), having its fixed ball and socket-joint half an inch below the lock, on the anterior surface of the handles, acts as a lever of the first kind, as well as a tractor, and by its means a greater axial control over the instrument is effected than by any other mechanism with which I am acquainted; whilst the whole additional contrivance is out of the patient's body and in sight, and all increase of bulk or complicity of the internal portions, are avoided. Moreover, the perineal pressure of such instruments as Tarnier's is advantageously relieved." (See fig. 678).

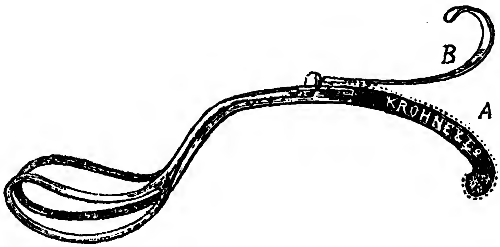
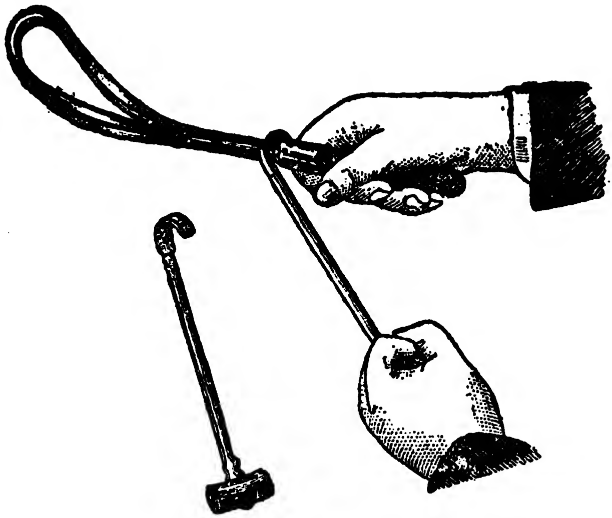


FIG. 678.
Holland's Axis-traction Forceps.
(B. M. J. 1886, *i*, 305).

1886. Stephenson.

William Stephenson, Professor of Midwifery in the University of Aberdeen, suggested the application of a simple hook, to any ordinary forceps, to serve the purpose of traction-rods of Axis-Traction forceps of the Tarnier type. He observes: "All forms of traction-rods which has as yet been devised are open to the serious objection that they greatly complicate the instrument; some simpler means is most desirable; and it would be a further recommendation if it could be applied to any form of the forceps, and be used or laid aside as desired. This I would suggest, is to be found in a simple hook, such is here figured (Figs. 679-80). What I first employed was the ordinary crotchet and blunt hook combined, using the crotchet end as the hook, and it answered very well. Held in the left hand, the tractor can when wanted, be attached between the

shanks and over the lock. With it so placed and the right hand grasping the handles in the ordinary manner, traction is made simultaneously with both hands, the right acting in the line of the handles, the left at a proper angle, so that the resultant will coincide with the line of the desired movement. The force can be thus exerted in any direction and changed at any time, without affecting the hold of the instrument, or throwing a strain other than direct traction upon the fœtal head. Perfect facility in the most delicate



FIGS. 679-80.
Stephenson's Hook for Axis-traction.
(B. M. J. 1886, *ii*, 412).

modification in the direction of the force is thus secured; simple traction without strain alone is used, whilst the means is simplicity itself, and can be used with any forceps. It is, I contend, a great mistake to relinquish the hold of the prehensile handles, as recommended, by Tarnier and his followers. We thus lose much of the valuable information which is conveyed through the instrument to the mind of the operator—that skilled tactus, the full value of which can be estimated by those only who possess it."

1887. Stewart.

W. S. Stewart of Philadelphia exhibited before the International Medical Congress held in Washington on September 5th, 1887, an improved forceps with parallel branches. (See fig. 681).

The advantages claimed are: (1) Either blade may be applied first. (2) The impossibility of its slipping when properly applied. (3) Moderate and even compression, the degree being regulated by the amount of resistance. (4) Great facility for making traction.

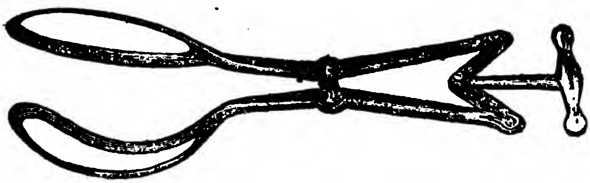


FIG. 681.
Stewart's Forceps.
(Tr. A. A. G. and O. vol. i).

1887. Foulis.

Dr. James Foulis devised a pair of Axis-Traction forceps mainly with the object of overcoming the following objections to Professor Simpson's forceps:—

"With these (Professor Simpson's) forceps it is most difficult, as you are drawing on the traction-rods, to control the descent of the head. And if as the result of the too rapid descent of the head after it has passed the zone of obstruction, the handles themselves happen to swing forward and you have not quickly brought forward the rods, the sharp edges of the traction-rods and the lower part of the blades of the forceps are in succession brought against the tight perineal tissues and in a moment rupture takes place."

"I shall now submit for your approval a pair of Axis-Traction forceps which I have devised, mainly with the object of overcoming the objections to Professor Simpson's forceps which I have described.

Let me shortly bring before you some of the anatomical data which have guided me in the construction of my forceps. If we examine a number of normal pelves, we shall find that the posterior surface of the pubic bone lies nearly parallel to the anterior surface of the sacrum at its upper part, and that the promontory of the sacrum is about $3\frac{3}{4}$ inches above the upper margin of the pubic bone. The great obliquity of the pelvic canal may be ever brought before us by recollecting that the vertical axis of the spinal column forms with the plane of the pelvic brim an angle of about 150°, but, of course, the angle is apt to vary according to the position of the patient when in labour. As we all know, the axis of the pelvic brim is represented by a line, drawn perpendicular to the plane of the brim, which extends from about the umbilicus to the tip of the coccyx, while the axis of the bony pelvic canal is made up of the sum of the axes of numerous planes lying at different levels in that cavity. If a line is drawn from the promontory of the sacrum to the upper margin of the pubic bone, and another line, drawn from the tip or apex of the sacrum to the under margin of the pubic bone, we have included between these two lines a bony cavity which does not alter its shape during the passage of the child's head through it; but above and below these two lines the axis of the parturient canal varies greatly according to circumstances. It is well to state also that the distance between the tip of the spine of the last lumbar vertebra and the upper margin of the pubic bone is about $7\frac{1}{2}$ inches.

It has always seemed to me that the curve of the blades of a pair of forceps should be made with reference to the axis of this immovable bony part of the parturient canal; and in the forceps which I have constructed, I have so arranged that when the handles lie well pressed back against the posterior angle of the vulva, the axis of the blades coincides as closely as possible with the axis of this bony pelvic canal. By examining a number of normal pelves we soon get a good idea of what that axis should be as regards its general curve, and on it the blades of the forceps should be constructed.

Now, having constructed such a pair of forceps, if they are pushed on in order to seize the head of a child at the inlet and we apply traction downwards and backwards in the axis of the handles, we shall find that the head as it advances comes in contact with the symphysis pubis (Fig. 682), unless, indeed, we can at the same time apply a force in such a way that the head is, as it were, lifted off the pubic bone as it moves downwards and backwards.

The blades of the forceps resemble very closely the blades of Professor Simpson's Axis-Traction forceps. The traction-rod

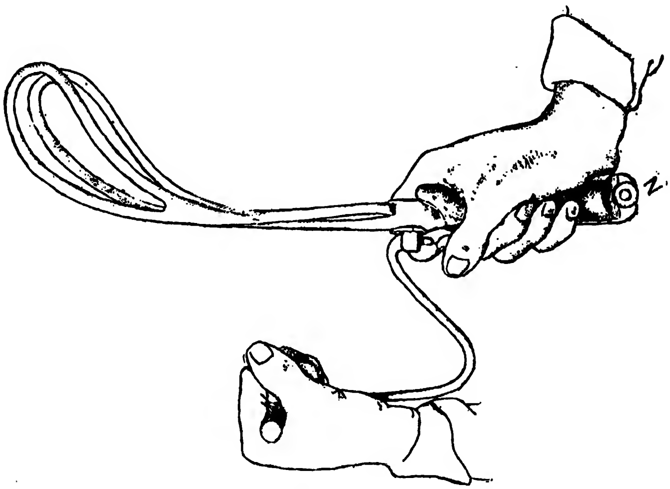


FIG. 682.
Foulis's Axis's-traction Forceps.
(Obs. Trans. Edin. XXII).

is not a fixture. It is not applied to the forceps until the latter have been applied to the child's head, and then it may be applied or not as you think proper. In the great majority of cases it will not be necessary to use the traction-rod but in high operations, where we wish to apply downward and backward traction by means of the handles, and at the same time to lift the head off the pubic bone, it will be necessary to fix on the traction rod to enable us to apply that compound force which is necessary in such cases.

The traction-rod is fixed to the forceps in a moment by slipping its square end into the strong socket. When the traction-rod is fixed to the forceps in this way, the horizontal part of it will be found to pass obliquely downwards and backwards for fully 6 inches, and then to turn upwards with a gentle curve behind the sacrum in a line parallel to the axis of the handles, as far as the lower angle of the fenestræ of the blades, at which point a strong but light wooden handle is attached to it. It will thus be seen that the forceps may be used as ordinary pair of long forceps, or they may be used as a pair of Axis-Traction forceps, at the option of the operator.

I should have stated before this that the blades are fixed in their position on to the child's head by means of a clamping screw at the end of the handles of the forceps. This clamping screw does not in any way interfere with the use of the instrument as a pair of ordinary long forceps.

By acting on the handles and on the parallel traction-rod at the same time, it is possible to make the head move in the line of any resultant we please, provided always, of course, that there is any room for the head to move in at all. I do not overlook the fact that when the child's head enters the pelvic cavity there is very little room for it to move in one way or another; but it makes all the difference in the world whether the head is pulled down on to the pubic bone or off it in a backward direction into the hollow of the sacrum. The traction force is, in truth, applied to the child's head by means of the external traction-rod, while the handles of the forceps not only control the advance of the head, but also, which is most important, give direction to the line of descent in which the head is to move. I count it of no small advantage that the traction-rod is entirely outside the parturient canal, and it is so attached to the forceps that it cannot in any way injure the perineal tissues. In these days of antiseptic midwifery, as little as possible in the way of septic material should be allowed to go into the parturient passages.

What I claim for my forceps is this, that it is possible by a proper combination of the two forces applied to the external traction-rod and to the handles, to give to the head a resultant,

a line of motion which must be looked upon as the axis of the whole parturient canal, and in this respect the instrument is a true Axis-Traction forceps. It seems to me that with this instrument we have the power of drawing the child's head through the entire parturient canal, in close apposition to the posterior wall of that canal. In which relationship the axis of the child's head in its descent through the pelvis must coincide closely with the general axis of the pelvic canal.

Hitherto I have only spoken of the powers of this forceps in connexion with the normal pelvic canal; but I know only too well that our chief difficulties are met with in cases of abnormal pelves, in the great majority of which there is a too great prominence of the promontory of the sacrum, and an approximation between it and the pubic bone. In these cases our difficulty is to get the head to pass under the abnormally projecting promontory, but surely if any power can effect this it is by the combination of the two forces which I have so frequently referred to. For, if it is true that in the normal pelvis we can make use of this power by means of my instrument, it is equally true that we can also make use of it in the abnormal pelvis; but it is a question of degree of abnormality whether it is possible to do it at all.

A moment's consideration will show us that in the abnormal, as in the normal pelvis, the posterior wall of the canal is the one that offers least resistance to the progress of the child's head after the promontory has been passed. The structures that are in danger of being injured by the forceps, and by the child's head in its descent through the pelvis, lie in front of the blades, not behind them. We see that Nature herself pushes the child's head through the pelvic brim directly on to the posterior wall or floor of the pelvic canal, whose function it is to guide and direct the escape of the child's head into the world. A study of the abnormal as well as of the normal pelves teaches us that our first endeavour should be to draw the child's head downwards and backwards in contact with the posterior wall of the pelvic canal, as the line of traction in which we shall meet with the least resistance.

On looking at Fig. 682, it will be seen that my forceps when in operation must be regarded as acting as a lever of the third kind. The head within the blades is the body to be moved, the power is applied through the traction-rod, while the fulcrum is in the handles which are ever moving downwards and forwards as the force is applied by the traction. It will thus be seen that, though the shanks of the forceps may at first be well pressed against the external angle of the vulva, directly the force is applied to the traction-rod, and the head moves downwards and backwards, the handles and the shanks move downwards and forwards, and the perineal tissues are less and less pressed upon by the shanks of the forceps, and thus escape injury as far as the instrument is concerned. Of course the large head and shoulders of a child may tear the perineal tissues in spite of all precautions on the part of the operator. When once the head has passed the pelvic brim, and has come in contact with the floor of the parturient canal, it is possible with my instrument to pull the head out of that canal in the axis of the outlet by means of the external handle the head being all the time kept under perfect control by means of the handles of the forceps.

Now, while I have ventured, for the reasons stated, to call my instrument Axis-Traction forceps, I am obliged to allow that it is impossible to construct a pair of forceps that will answer equally well in all pelves, for the simple reason, that all pelves, especially abnormal ones, differ more or less as regards their axes, etc., but I hold that the instrument which enables us to draw the child's head through the pelvic canal in all cases, in contact with the posterior wall rather than with the anterior wall, has the best claims to be called Axis-Traction.

Professor Simpson's instrument is Axis-Traction, because it draws the child's head through the pelvic canal in contact with the posterior wall of the canal, and it does this by reason of the attachment of the traction-rods to the under or convex edges of the blades; but this very attachment of the traction-rods to the underedges of the blades brings into existence a danger, inasmuch as, when the blades are pulled upon by the traction-rods, the handles of the forceps may at any moment

swing forward; and should traction otherwise than parallel to the handles of the forceps suddenly come into operation, the blades of the forceps with the child's head are in danger of cutting through the perineal tissues.

Such an accident cannot happen with the instrument I have brought before you this evening, if you will only bear in mind when using this pair of forceps that the pulling or pushing force is applied to the head by means of the external handle, and that the blades with the included head may be kept under perfect control by means of the handles of the forceps.

Don't let it be said that we have too much power with this particular form of forceps. That we have great power with it cannot be denied. No man, however, should use more power than is justifiable in his attempt to extract the child. There is a limit to the amount of traction force that should be used, and when that is reached, it becomes our duty to diminish the child's head by puncture, and extract it lifeless rather than injure the mother by persistent attempts to overcome the impossible."

Dr. Foulis showed before the Obstetrical Society of Edinburgh on May 9, 1900, a new handle to be applied to the ordinary Axis-Traction forceps. He showed that there were objections to the present T shaped handle in practice and he thought a perfectly straight handle which rotated on its own axis, got over these objections completely.

1887(?) Reamy.

Thaddeus Asbury Reamy was born in Frederick County, Virginia, April 23, 1829. He obtained his M.D. from the Starling Medical College in 1854. He practised medicine at Zanesville until 1871, when he moved to Cincinnati. He was Professor of Materia Medica and Therapeutics in Cincinnati College of Medicine and Surgery from 1858 to 1860; professor of Diseases of Women and Children in Starling Medical College from 1864 to 1871; Professor of Obstetrics, Clinical Midwifery and Diseases of Children in the Medical College of Ohio from 1871 to 1888, when he became Professor of Clinical Gynecology.

He was also Obstetrician and Surgeon to the Good Samaritan Hospital. Numerous honors were conferred upon him. He held the first obstetric clinic ever held in a College Amphitheatre in America. He died of chronic interstitial nephritis on March 11, 1909 at the home of his niece in Cincinnati.

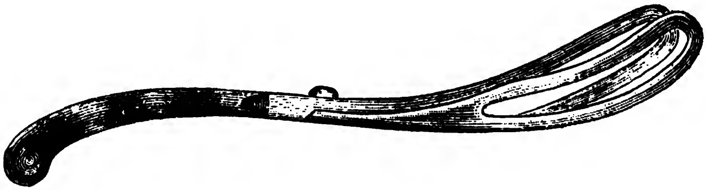


FIG. 683.
Reamy's Forceps.
(Parvin).

His forceps is referred to in Mann and Hirst's system of obstetrics. (See fig. 683).

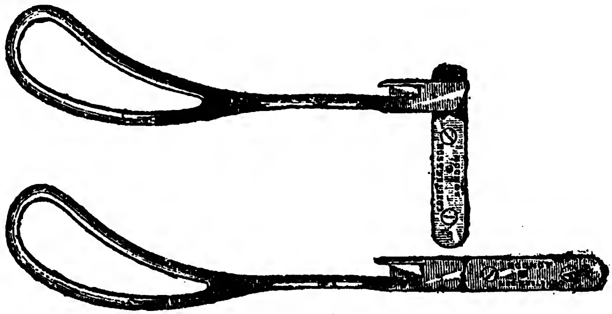
1887. Haslam.

Wm. D. Haslam, Obstetric Assistant to University College Hospital constructed a forceps to obviate the difficulty of introduction of the upper blade. The modification consisted in reversal of the ordinary way of lock adjustment so that when the upper blade is in position (having its lock forwards) there will be plenty of freedom for the passage of the lower blade.

On account of the rigid blade, it has hitherto been necessary to draw the patient to the edge of the bed and bare her buttocks. This unpleasant procedure has been obviated, thus:—in the handle of the upper blade adjoining the lock there is a lateral hinge which flexes backwards but which is rigid to forward pressure; when closed it moves on two plates with a concealed pivot, constructed in such a way as not to impair the strength of the blade for leverage or traction, neither is it conspicuous when the handles and locks are in apposition.

The shanks are made sufficiently open to admit the index finger comfortably for traction and the handles are full long.

When the handle is flexed the upper blade is shortened and can be introduced without altering the position of the patient, supposing she is in the usual obstetric position. The upper blade being passed, the lower easily follows.



FIGS. 684-5.
Haslam's Forceps.
(B. M. J. 1889, *i*).

The forceps have also been fitted with Dr. Aveling's handles, the curve of which greatly aids the design of the instrument.

1887. Pearse.

Dr. Pearse exhibited before the British Gynæcological Society a forceps with a hinge which enabled the general practitioner to carry it about conveniently. It possessed the

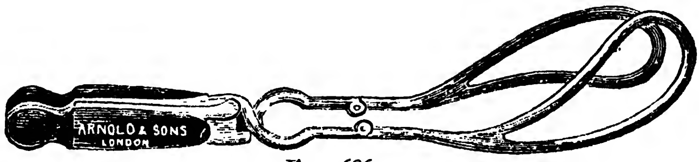
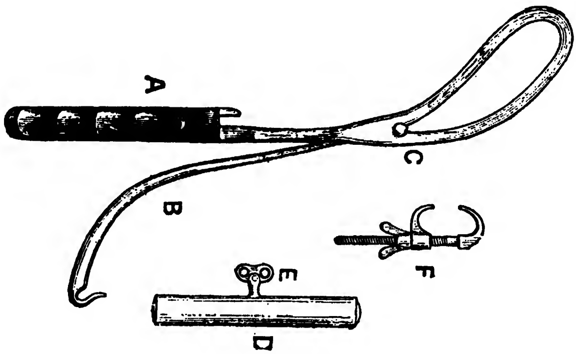


FIG. 686.
Pearse's Forceps.
(Hinged).
(Arnold and Sons.)

advantage of being easily applied; the handle of the first blade could be moved either backwards or forwards, while the other blade was being inserted.

1888. Reynolds.

E. Reynolds* constructed this new appliance which consists of a pair of curved traction-rods, terminating at each extremity in a hook. The upper hook is intended to fit into the extremity of the fenestrum and ends in a flat button of the size and shape which has been found by experiments in actual practice to be best adapted to allow of an easy application and to insure its retention in position. The hooks at the lower end of the rods slip into rings attached to a traction-handle and fit loosely enough to allow considerable rotation. The handles of the forceps are fastened by a separate clamp



FIGS. 687-9.
Reynold's Axis-traction Rod.
A, Forceps; B, rod; C, button by which the rod is attached; D, traction-handle; E, swivel-bar, to compensate for any difference in the length of the fenestra; F, clamp.
(Reynolds).

of simple construction, somewhat resembling a monkey-rench. This apparatus is made of the best steel, finely finished and nickel-plated. It is thoroughly efficient, easily applied and still more easily kept clean.

1888. Kade.

H. Kade described a supplement to the forceps, which allowed of traction in the proper axis of the pelvis.

*"Practical Midwifery," by Reynolds.

1888. Grattan.

N. Grattan described his forceps thus:—

"The engraving depicts a forceps which in almost every respect resembles Barnes's long forceps, with the German shoulder and by withdrawing a spring catch in each the handles can be bent in a line corresponding with the perineal curve and be firmly fixed, thus in a second converting it into an excellent Axis-Traction instrument. As in Aveling's forceps, the perineal curve is produced in the handles which serve for traction.

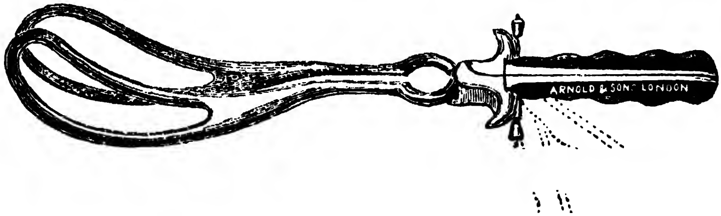


FIG. 690.
Grattan's Forceps.
(Arnold and Sons).

Finally the handles can be fixed at right angles so as to enable the instrument to be stowed away in an ordinary coat pocket. The engraving shows the forceps as in ordinary use and the dotted lines the other positions in which it can be locked." (See fig. 690).

1888 (?). Gillette.

Gillette's forceps is illustrated in Tiemann's catalogue. (See fig. 691). No description is available.

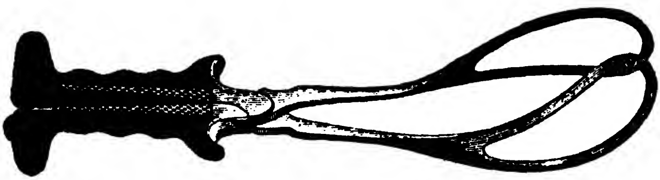


FIG. 691.
Gillette's Forceps.
(Tiemann).

1888 (?). Priestley.

William Overend Priestley was born on June 24th, 1829, at Morley Hall, Churwell near Leeds. In 1853 he took the degree of M.D. and then worked as physician's assistant under Sir James, Y. Simpson. In 1856 he set up in London as a physician. In 1859 he was elected Physician-Accoucheur to St. Marylebone Infirmary and in 1860, to the chair of Midwifery and the post of Physician-Accoucheur to the Middlesex Hospital which he held until 1863. On the retirement, in 1863, of Dr. Arthur Farre he was made Professor of Obstetric Medicine to King's College and Physician-Accoucheur to its hospital. In 1872 he resigned his appointment at King's College. In 1893 he received the honour of Knighthood. He was a man of many-sided activities. His contributions to medical literature have been numerous and valuable. He died on April 12th, 1900.

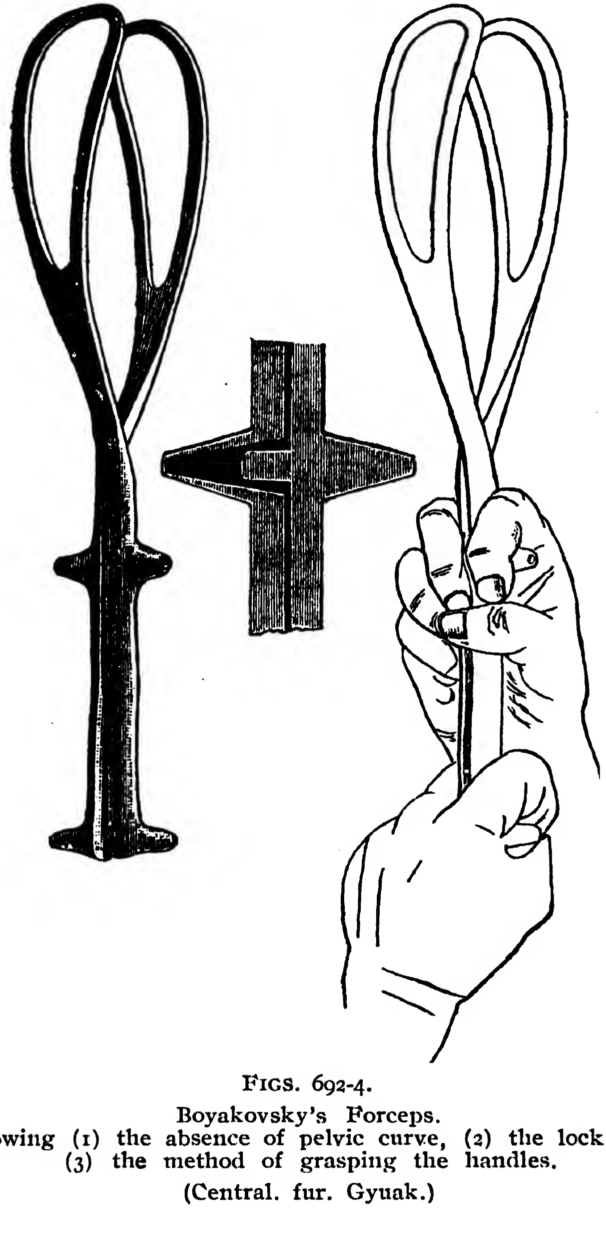
He evidently modified the forceps (*Vide* Lynch's Catalogue 828 D). No description or diagram is available.

1889. Boryakovsky.

This forceps has only the ordinary cephalic curve. There is no pelvic curve, which was introduced by Levret to facilitate the extraction of the head in posterior positions. Boryakovsky is of the opinion that pelvic curve is of no use in posterior positions. There is only partial overcrossing of the branches, thus a more regular and effective application of manual force is obtained and the compression of the head is avoided. The articulation is made by a pin entering a hole.

1889. Fry.

Henry Davidson Fry was born in Richmond Virginia, April 11, 1853. He received the degree of M.D. from the University of Maryland in 1876. In 1890 he was made Professor of Obstetrics in Georgetown University, which position he held almost continuously until 1918. He served for long periods as Chief Obstetrican and Gynecologist to Garfield Memorial



FIGS. 692-4.
Boyakovsky's Forceps.
Showing (1) the absence of pelvic curve, (2) the lock and (3) the method of grasping the handles.
(Central. fur. Gynak.)

Hospital, Chief Attending Obstetrician to Georgetown University Hospital and Attending Obstetrician to Columbia Hospital for Women and Lying-in Asylum. His contributions to medical literature were numerous. He died on May 12, 1919 of diabetic thrombus.

Dr. Henry D. Fry of Washington designed this instrument to obviate the difficulty of adapting the blades of the ordinary forceps to the biparietal diameter of the head, before forward rotation of the occiput has taken place. It is practically a straight forceps with the pelvic curve on the flat, instead of the edge. This idea (of antero-posterior forceps) was adopted by Uytterhoven of Brussels in 1805 and M. Baumers of Lyons in 1849. Leake also designed a forceps with a third blade intended for application in front. Sloan and Reid of Glasgow

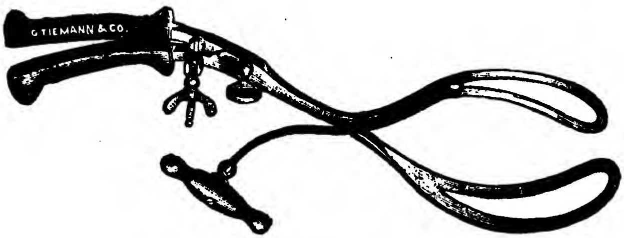


FIG. 695.
Fry's Forceps.
(Amer. Jour. of Obs. XXII.)

also brought to the notice of the profession, instruments of this class.

"The forceps which I desire to bring to the notice of the profession consists of a long posterior and a short anterior blade. The posterior blade presents but one curve a cephalic and a pelvic curve combined. The anterior blade has its two curves in opposite directions. The concave surface of the cephalic curve looks backwards and that of the pelvic curve forwards. The shape of the blades and the distance between them are the same as White's modification of Hodge. The shanks are long and placed laterally. Siebold's lock is employed. The handles are constructed of hard rubber. The length of the instrument, measured in a straight line from

the tip of the posterior blade to the end of the handle is 16 inches. From the same point to the lock is 9½ inches. The length of the handle is 5 inches."

"The traction-rod and compression-screw are intended for use in high application of the forceps. After the blades have been adjusted and the amount of compression necessary been secured by the screw, the hook at the end of the rod is fastened into the fenestrum on the anterior blade. Traction is then made with the right hand while the left grasps the handle of the forceps merely to steady it."

1889. Bredin.

J. N. Bredin describes his forceps thus:—"The forceps is a long one, with cradle hinges folding on the handles admirably adapted for pocket use, measuring in length 8½ in. by 3½ in.

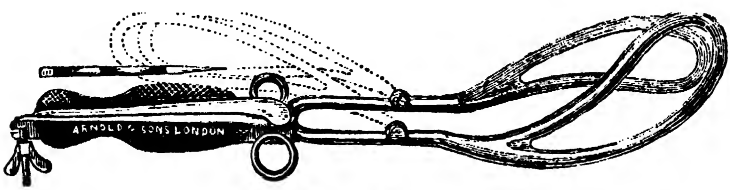


FIG. 696.
Bredin's Forceps.
(Arnold and Sons.)

I have adopted rings instead of crutches. During traction the handles are kept in apposition by a winged-screw, obviating the necessity of using tape. I have had inserted into one of the handles an instrument for rupturing the membranes, which I hope on some occasions may be found serviceable. A portable forceps must certainly prove a boon, at least to the country practitioner who has no doubt like myself, found himself seated perhaps on a restive horse with a long forceps dangling against its sides, on a dark night and on a dangerous road."

1889. Lange.

No description or illustration of Lange's forceps is available. (See ref.).

1889 (?). Prague.

An illustration of the forceps of this school is given in the surgical instrument catalogue of Jetter and Scheerer. (See fig. 697).

1889. Sloan.

Dr. Samuel Sloan of Glasgow designed an antero-posterior forceps, for those cases in which the head lies well above the brim, with the anterior parietal bone overhanging the pubes—and where the ordinary forceps fails. His instrument is first, a compressor and then a tractor. The dimensions are:—Total length 15 inches; handles $5\frac{3}{4}$ inches; fenestra 4 inches; breadth of blade $2\frac{1}{4}$ inches; breadth of rim $\frac{3}{8}$ inch; thickness of rim $\frac{1}{8}$ inch. The head curve of the blade is a segment of a circle whose diameter is 9 inches. The transverse curve of the anterior blade is a segment of a 5-inch circle with the convexity looking forwards; that of the posterior being a segment of a 20-inch circle with the convexity also forwards. When the handles are closed, the blades are at the widest part $1\frac{1}{2}$ inch apart; the tips being then only $\frac{1}{8}$ inch separate. The edges of the rims are well rounded; the shanks are very strong and the lock is very loose; whilst the pelvic angle measures 30 degrees. The instrument weighs only 22 ounces.

Axis-Traction may be effected by means of a towel passed through a ring in the shank near the lock, as in Barnes' forceps, whilst the handles are used wholly for compression and for antero-posterior pendulum movement. The introduction is extremely easy. The anterior blade is slipped over the occiput and then passed along the side of the head till it lies exactly behind the pubes. The posterior blade is then introduced along the right side of the anterior one first into the hollow of the sacrum and then upwards till the promontory is felt to lie in the fenestrum.

1889. Blenkarne.

In describing his improved midwifery forceps, W. L'Heureux Blenkarne, says:—"Very little, if anything, has

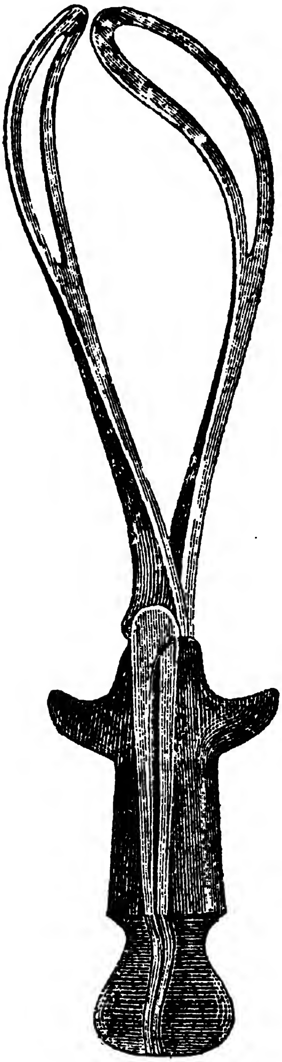
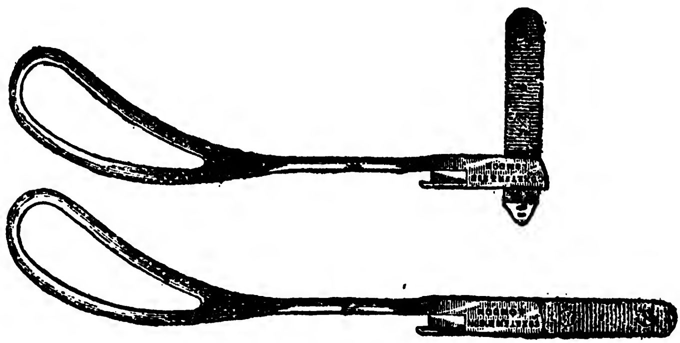


FIG. 697.
Prague Forceps.
(Jetter and Scheerer).

been done to make the long forceps a less cumbrous and unwieldy instrument, especially as regards the adjustment of its upper (or anterior) blade.

There are, indeed, Dr. Haslam's forceps (*vide* illustration), in which the upper blade can be shortened during adaptation by there being a hinge-joint in the handle; but, however admirable the general construction of these forceps may be, they are absolutely useless to those practitioners who, like myself, "put on" the lower blade first, as the "lock" of the lower blade is posterior—that is, the lower blade itself is anterior—thus making it utterly impossible to adjust the upper



FIGS. 698-9.
Blenkarne's Forceps.
(B. M. J. 1889, *i*).

blade secondarily (at any rate without a great risk of damaging the rectum). Then, again, the handle of Dr. Haslam's forceps is made to bend backwards towards the perineum, where it is in the way. Now, in the forceps which I have invented (*vide* figs. 698-99) the handle is arranged to bend forwards towards the pubes, where it is not only not in the way, but, on the contrary, when bent, it forms a good "grasp" for the hand when adjusting it on the fœtal head.

With these forceps, although they are slightly longer than "Simpson's long" (Dr. Haslam's being about an inch and a quarter shorter than Simpson's), the adjustment of the upper blade is not only simplified as regards the obstetrician, but

(and this is a most important gain) all necessity for removing the patient to the edge of the bed is avoided, there being no handle to get in the way of the mattress; in fact, it is as easy to put on these forceps as it is an ordinary pair of short forceps.

The general design of the forceps may be described as Barnes's forceps with Simpson's handles, the steel surface of the handle of the upper blade being slightly corrugated."

1889. McGillicuddy.

T. J. McGillicuddy of New York described a new combined Axis-Traction forceps to be used as an alternative to craniotomy. "This instrument is the ordinary forceps of

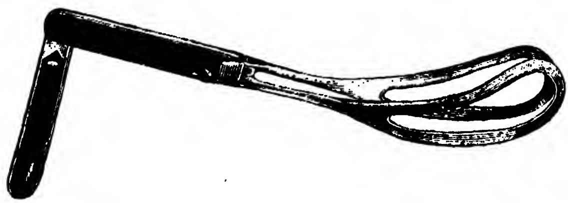


FIG. 700.
McGillicuddy's Forceps.
(Amer. Jour. of Obs. XXII.)

Simpson or Elliot, provided with adjunct handles, making each blade and handle as firm as if it were one solid piece. With it we can make traction in the ideal pelvic axis during the entire passage of the head."

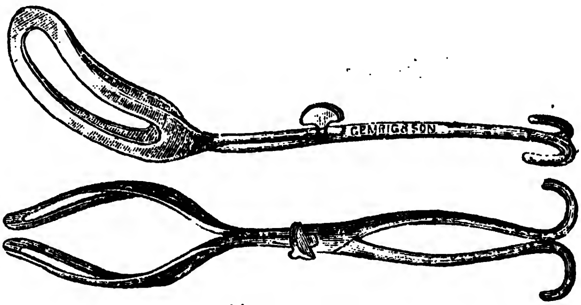
The special feature consists in the addition "of shorter handles projecting at right angle from the end of the others when in use as Axis-Traction forceps but being folded on the latter when employed as ordinary forceps."

1890 (?). Frost.

This forceps is mentioned in Brady and Martin's catalogue. No illustration or description is available.

1890. Pazzi.

Pazzi of Bologna described a forceps of his invention before the eleventh International Medical Congress, held in Rome in 1894. His conclusions were as follow:—(*a*) The constructive theory of the new forceps is entirely original, in that the object desired was to make the blades movable upon the handles, not to obtain a larger pelvic curve, but in order that the blades themselves might be parallel with the walls of the pelvis. (*b*) The mechanism of construction and of action of the hinge is not the same thing as the unlocking of the handles of some forceps. (*c*) The new forceps, is simple, light in weight, inexpensive and easy to use. (*d*) It may be modified in shape if necessary, but must retain the hinge, which permits of traction in the axis of the pelvis, and is the chief object of his invention.



FIGS. 701-2.
Holt's Forceps.
(Parvin).

1890. Holt.

Dr. Joseph Holt of New Orleans formerly Professor of Obstetrics in the New Orleans School of Medicine constructed a forceps which is used by many southern practitioners. The inventor presents the following claims in its behalf: "A minimum weight of metal compatible with full efficiency. Such a distribution of metal as shall insure resistance and compressing power where these are especially required, elasticity where required, and all in proportion. The pelvic curvature is in

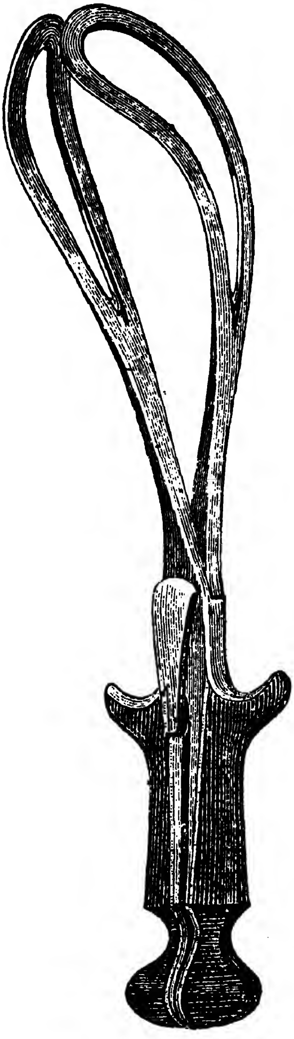


FIG. 703.
Leipzic Forceps.
(Jetter and Scheerer).

FIG. 704
Ramdohr's Forceps.
(N. Y. J. of Gyn. and Obs. II).

actual correspondence with the curve of Carus, whereby the instrument can be applied at the superior strait, or even above the brim, as easily as at the pelvic floor. On account of this curvature the head at the brim can be pushed downward and backward in the direct axis of the superior strait as surely as it may be drawn down with a Tarnier forceps and that too with all the power of which a man is capable, certainly enough for the safety of maternal and fœtal tissues. It can accomplish the work of the latter instrument without any of its complex machinery. Again this curvature insures the points at no time pressing upon the sacrum. The blades accurately adjust themselves to the child's head securing uniform and general distribution of elastic pressure. The points, nearly parallel and flat enable the blades to be passed, insinuating themselves between impacted surfaces. There is no degree of impaction

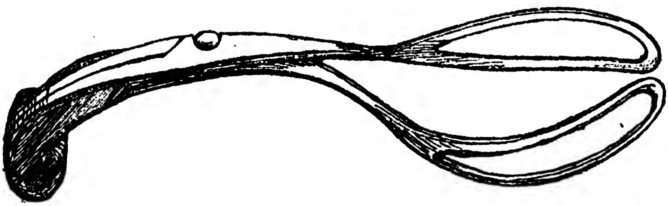


FIG. 705.
Wagstaff's Forceps.
(Weiss).

that will not permit the instrument to be applied without force as abundantly proved in practice. Being on, the points compress gently but never injure; this peculiar modification in the points was introduced many years ago by Dr. Warrington of Philadelphia."

1890 (?). Leipzic.

The Leipzic forceps is illustrated in Jetter and Scheerer's catalogue. (See fig. 703).

1890 (?). Ramdohr.

C. A. Von Ramdohr, Professor of Obstetrics of N. Y. Post-Graduate Medical School, constructed a forceps which

FIG. 706.
Walcher's Forceps.
(Jetter and Scheerer).

combined the good qualities of some of the best instruments. It was a modified Elliot forceps. (See fig. 704).

1890 (?). Wagstaff.

This forceps is illustrated in Weiss's catalogue. (See fig. 705).

1890 (?). Walcher.

Walcher's forceps is illustrated in Jetter and Scheerer's catalogue. (See fig. 706).

1890 (?). Weiss.

Mention is made of this forceps in Weiss's catalogue.

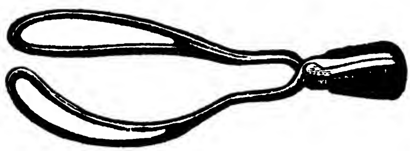


FIG. 707.
Adams's Forceps.
(Arnold and Sons).

1891. Lyman.

A. B. Lyman contrived a "direct axis midwifery tractor." The original reference is not available for verification.

1890 (?). Adams.

This forceps is illustrated in Arnold and Son's Catalogue. No description is available. (See fig. 707).

1890 (?). Ashwell.

Mention is made of Ashwell's forceps in Geo. Curling's catalogue. No description or illustration is available.

1890 (?). Baker-Brown.

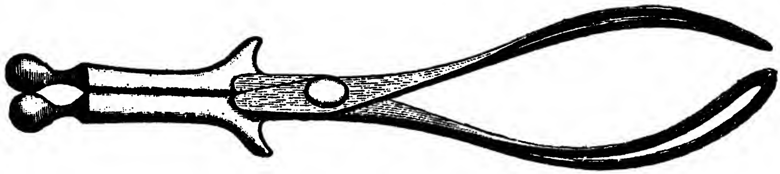
Baker-Brown's forceps is mentioned in the catalogue of Charles Lentz and Sons of Philadelphia. It is not illustrated therein.

1890 (?). Chida.

An illustration of this forceps is to be found in the Surgical Instrument catalogue of Tokichi Iwamato of Tokyo. (See fig. 708).

1890 (?). Hamada.

Hamada's forceps is illustrated in Tokichi Iwamato's catalogue. (See fig. 709).



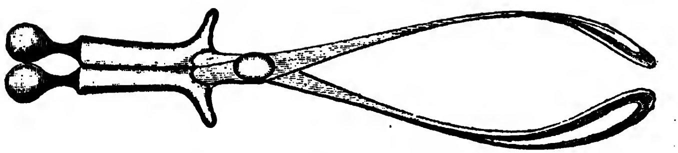


Fig. 708. Hamada's Forceps.
Fig. 709. Chida's Forceps.
(Tokichi Iwamoto).

1890 (?). Sakakj.

This forceps is mentioned in Iwamato's catalogue. It is not illustrated.

1890 (?). Hecker.

Hecker's forceps with non-fenestrated blades is mentioned in Parvin's Obstetrics.

1890 (?). Leavitt.

Leavitt's forceps is illustrated in Sharp and Smith's catalogue. (See fig. 710).

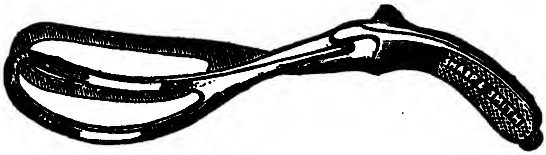


FIG. 710.
Leavitt's Forceps.
(Sharp and Smith).

1891. Murray.

Robert Milne Murray was born at Fettercain Kinkerdineshire on May 6th, 1855. After a distinguished career at the University of Edinburgh he graduated M.D. with first class honours in 1879. Shortly after he obtained the post of assistant to Dr. Halliday Croom. In 1886 he commenced to lecture on midwifery and diseases of women in the extra-mural school. He was one of the Physicians to the Royal Maternity and Simpson Memorial Hospital. In the multifarious duties of a strenuous life, his contributions to medical literature were many. His intimate knowledge of Science enabled him to construct with mathematical accuracy, an Axis-Traction forceps in strict accordance with the principles involved. He was a high authority on electricity in its numerous details. In November, 1902, he caught a chill which was followed by pneumonia. Pulmonary complications set in for which he visited several health resorts with no good effect. Ultimately he was advised to undergo an operation involving the resections of the parts of several ribs. This was done on February 11th, 1904, but he never completely rallied from the anæsthetic and died from heart failure on 14th February, 1904.

Milne Murray's contribution on the Axis-Traction forceps is of such importance that we quote in full his paper on the subject read before the Obstetrical Society of Edinburgh.

"It is first necessary to ask what is the problem presented to us in delivery by the forceps. The answer to this may be briefly put thus: "To draw the fœtal head through the pelvic canal with the least expenditure of force." It is quite plain that all force expended in this operation above the minimum necessary to overcome the resistance of the canals is transmitted to these canals, and will injuriously affect the mother. It then follows that the best instrument is that one which will enable us to accomplish our purpose with the least amount of force.

Now this problem (simple as its statement seems) is rendered somewhat complex by two circumstances—(1) The pelvic canal is curved; (2) The fœtal head is not a sphere but must be regarded as an irregular ovoid or asymmetrical wedge.

The Straight or Chamberlen Forceps.

Putting aside in the meantime the second condition, the asymmetry of the fœtal head—let us consider the difficulty arising from the curvature of the canal.

Now we must bear in mind that the axis of the inlet along which the axis of the mass of the fœtal head will enter the brim is a line joining the umbilicus and coccyx, while the axis of the outlet along which the forceps must enter the the pelvis is a line joining the tip of the promontory and the centre of the vulva. These lines cross each other at an angle at a point about the centre of the middle plane of the cavity; and it is obvious that if a pair of straight forceps are carried along this line they will either miss the head altogether or seize it so far back, *i.e.*, so near the promontory, as to render a firm grasp of it almost impossible.

Let us suppose, then, that the forceps are now so adjusted that the handles are brought back towards the perineum so as to stretch that structure, then the blades can be correspondingly carried forwards so as to grasp the head in such a way as to avoid slipping.

Let the line E F (Fig. 711) indicate the position occupied by the axis of the forceps. Supposing traction is now made along that line, it will be obvious by simple inspection that a certain amount of the force exerted will be spent on the pubis—in other words, only a certain amount of the force expended serves to advance the head, the remainder is dissipated in crushing the head against the pubis; and it is equally obvious that, in order that all the force expended on the forceps be effective in advancing the head, the axis of the forceps must be in the line A B, but the anatomical disposition of parts renders this impossible.

There is thus with the straight forceps an inevitable expenditure of ineffective force, measured in the diagram by the angle X formed between A B and E F. By a simple proof

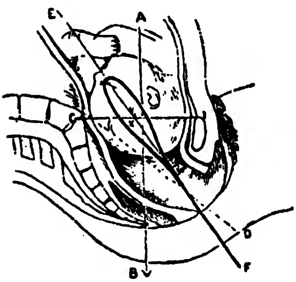


FIG. 711.

Application of Straight Forceps at brim. C I conjugate of brim; C D axis of outlet; E F, axis of forceps and line of traction; B X F, angle of error.

(Milne Murray).

it can be further shown that the ratio of effective to ineffective force bears a distinct relation to the value of the angle B X F. Thus the effective force is as the cosine of X, while the ineffective force is as the sine of X.

Accordingly, so long as the angle at X exists—in other words, so long as the line A B and E F do not coincide—a certain amount of the force expended in traction will be ineffective. This amount will be measured by sine X. Now, the smaller X becomes (or the more E F approaches A B) the further will the value sine X recede from unity, while at the same time the more will cos. X, the measure of the effective force, approach unity. When the lines A B and E F coincide, X of course disappears, and the total force becomes effective. The efficiency of the forceps used as a tractor will thus be

measured by the angle X, and will be inversely proportional to sine X, and directly proportional to cos. X. But it is perfectly obvious that with straight forceps E F can never coincide with A B, so that the angle at X always exists.

The first and essential error of the straight forceps then is, that some of the force applied in traction is expended on the tissues of the mother, and not in advancing the child's head.

But now we must consider the relations of the forceps to the fœtal head.

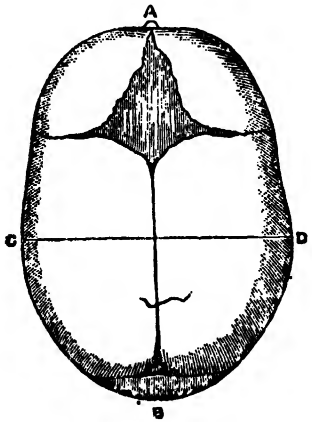


FIG. 712.

Fœtal Head seen from above. A B occipito-frontal diameter = major axis; C D biparietal diameter = minor axis.

(Milne Murray).

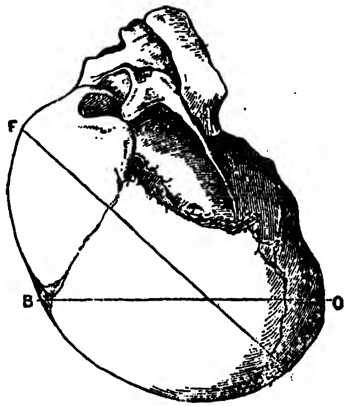


FIG. 713.

Fœtal skull as it enters the Brim. F O, fronto-occipital diameter; B O, sub-occipito-bregmatic diameter.

(Milne Murray).

The fœtal head is not a perfect sphere. Looked at from above it is an avoid, its major axis A B (Fig. 712) antero-posterior, its minor C D transverse, but somewhat behind its middle diameter. Looked at from the side, it presents the appearance of a truncated asymmetrical wedge. The posterior end O (Fig. 713) abrupt and steep, the anterior F flat and sloping. According to Lahs' view, it is this conformation of the fœtal head that permits the more rapid descent of O through the girdle of resistance, which descent effects the

introduction of the short sub-occipito-bregmatic diameter into the pelvic inlet. However this attitude of the head is brought about, it is, of course, of essential importance in the mechanism of labour, substituting as it does the sub-occipito-bregmatic for the occipito-frontal diameter, a difference of $1\frac{1}{2}$ in. or thereby. Thus, in a typical L O A, case, we may say that the plane formed by the expansion of the sub-occipito-bregmatic diameter enters the brim parallel with the plane of the brim.

Now, a glance at the relation of the line F F to the fœtal head at the brim will show that on account of the blades grasping the head too near the sinciput the inevitable result of traction must be to depress the sinciput, the occiput forming a pivot on the anterior pelvic wall. Now, were the head a sphere, this would not be of any consequence, because all diameters of a sphere are equal ; but with the fœtal head it is different, because its immediate effect is to drag down the sinciput and replace the sub-occipito-bregmatic by the occipito-frontal, and so undo "flexion."

Now this is a point of most essential importance in relation to the action of straight forceps, and is not quite sufficiently insisted on in our books, because it is really the one point in which straight forceps fail as compared with the curved. Being incapable of taking a mesial or symmetrical grasp of the head, they drag down the sinciput, and so naturally increase the difficulty by dragging in the larger diameter.

This fact is further borne out if we consider their action in the treatment of occipito-posterior cases. It is assumed by those who advocate the straight forceps that they are specially useful in these cases, and this claim chiefly rests on the ease with which they permit internal rotation. I do not deny their advantage in this respect; but it is probably of much more consequence that in posterior cases they, in virtue of their inherent defect in relation to anterior cases, grasp the occipital end of the head (which is now posterior), and so pull it down, tending thereby to increase flexion and favour the mechanism natural to such cases. No doubt the absence of the pelvic curve is of advantage in expediting internal rotation, the

forceps requiring no re-application after the process is complete, but their chief advantage lies in the direction I have indicated.

It follows, then, that the faults of the straight forceps are: (1) Faculty direction of traction; (2) Unsymmetrical grasp of the fœtal head tending to substitute the O F. diameter for S O B diameter, *i.e.*, "to undo flexion."

THE CURVED OR SMELLIE FORCEPS.

Let us now consider the advantage to be obtained from addition of the pelvic curve to the forceps. Here, as in the straight instrument, the line E F (Fig. 714) represents the direction of the handle and shank, but the blade now lies in the line A B. By this means we obtain a grasp of the

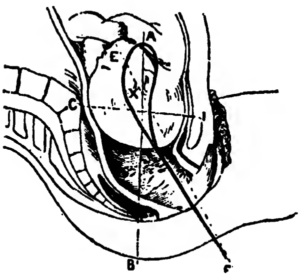


FIG. 714.

Application of Curved Forceps at Brim. C I conjugate of brim; A B, axis of inlet; E F axis of forceps and line of traction; B X F, angle of error.

(Milne Murray).

head which is symmetrical to its mass. In other words, when traction is made on the instrument, having such a grip, the relation of the anterior to the posterior end of the head is not altered. The traction *a fronte* being symmetrically distributed on the head, just as Lahs has shown the pressure *a tergo* is in normal labour, the contour of the head determines the relative depression of the occiput as compared with the sinciput during advance; and traction by means of this forceps, whatever the direction may be, tends in no way to interfere with the entrance and descent of the head by the sub-occipito-bregmatic diameter. This is obviously an enormous gain, and at once eliminates a primary defect of the straight forceps. The curved forceps then enables us to effect delivery with the fœtal head mass in the most favourable diameters

But having stated this, we have stated the whole mechanical advantage it possesses over the straight forceps, for the direction of its traction is just as defective as that of the straight instrument.

The line of traction will be represented by the line passing through the shanks and handle E F. This line, again, meets the axis of the inlet at an angle whose cosine measures the effective force, and whose sine measures the ineffective. It is thus plain that the advantage of the curved forceps over the straight, when employed in simple and direct traction, consists solely in the fact that it avoids displacing the most favourable diameter of the child's head for a less favourable one and that

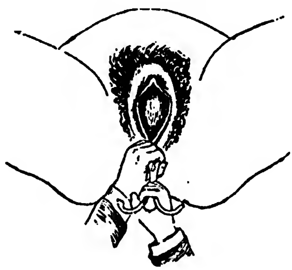


FIG. 715.
Pajot's Manœvre.
(Milne Murray).

it has the disadvantage of faulty direction of traction to the same extent as the straight instrument.

The faulty direction of traction of the Smellie forceps has, of course, been recognised for many years; and with the view of obviating the loss of power to some extent, various devices in employing them have been made by different obstetricians. I shall only refer to two of them, because they are the types under which all the others may be classified. Many of the devices have been claimed as prior applications of Tarnier's principle, but this is quite unjustified, as can be readily understood on considering the principles involved. The first of the devices is that known as "Pajot's manœuvre" (Fig. 715). This is performed with the well-curved, long-handled Levret forceps,

both of the which characters are essential in the instrument employed for this purpose.

Suppose the head is at the brim and well-curved Levret forceps applied, the blades will grasp the head in or at least parallel with the axis of the brim. The handle forming an obtuse angle will be somewhat behind the axis of the outlet. By grasping the lock in the left hand, which acts as a sliding fulcrum, while the handles are carried upwards towards the abdomen, the blades are made to descend downwards and backwards in the axis of the inlet, and in this way the head is dragged into the cavity approximately along that axis. This pivoting action of the instrument must at the same time be combined with traction, so that a complex movement of the hands and instrument is necessary. The left hand is not a fixed fulcrum, but must move downwards and backwards at a rate corresponding with the advance of the head.

Now it is quite obvious that the success of the operation depends entirely upon the adjustment of the amount and direction of the forces ought to move the head in the axis of the pelvis for the time being. But as we can see neither the head nor the pelvis, it is obvious that the adjustment of the two powers is a matter of skilled judgment. Further as the head advances, the direction of the canal is continually altering, and it is obvious that the accurate adjustment becomes a matter of increasing difficulty, and, indeed, practically impossible. Precisely the same objection applies to the second type of device, of which the instrument of Hermann is an example. This instrument has, by more than one writer, been placed in competition with Tarnier in the claim for priority. But as a matter of fact, it is simply a mechanical appliance for facilitating Pajot's manœuvre, and has nothing in common with Tarnier's.

In Hermann's instrument (Fig. 716) a second pair of handles (straight), attached by a link joint to the blade, are held in the left hand, while the handles proper are held in the right. It is easy to see, without any special demonstration, that a movement of the blade in any desired direction could be obtained as a resultant of component forces acting on B and A. But

the difficulty again arises, in what direction to apply this resultant force; in other words, how are the components to be adjusted?

A moment's consideration will show that Hermann's instrument is thus simply a mechanical elaboration of Pajot's principle—has the same advantages and the same defects.

To this class belongs, too, the instrument shown and described to the Society by Dr. Foulis. The difference of Hermann and Foulis instrument is simply this—that in the latter the second traction handle is attached by a rigid attachment, and in Hermann's by a link. The rigid attachment in Foulis' instrument probably gives an easier method of adjust-

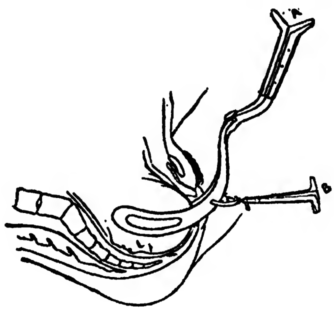


FIG. 716.
Hermann's Forceps.
(Milne Murray).

ing the component elements, but the difficulty of fixing the direction of the resultant remains precisely the same.

We thus see that the curved forceps, used as a simple tractor, while grasping the fœtal head at the best advantage, transmits the force to the head at a loss, and that the devices suggested to remedy this so far are unsatisfactory, in so far as they demand the skilled judgment of the operator to employ them.

THE AXIS-TRACTION TARNIER FORCEPS.

There can be no doubt that to Hubert of Louvain is due the credit of giving the first practical suggestion of the solution

of the Axis-Traction difficulty ; and imperfect as his instrument is, it contains the germ of the later appliance. Hubert solved the problem, so far as the brim of a normally pitched pelvis is concerned, by simply adding a rigid bar, which projected at right angles to the shanks of the forceps to a distance such that a line joining the umbilicus and coccyx, *i.e.*, the axis of the brim, passed through it (Fig 717). By making traction on this bar only in this line, which can be always determined with practical accuracy, the head will be dragged into the brim in a line corresponding to the axis of the inlet. Thus, so far as the

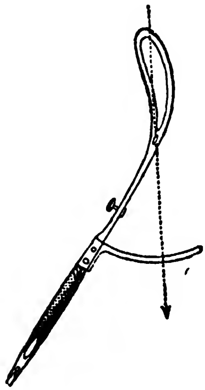


FIG. 717.
Hubert's Forceps. The arrow shows direction of traction. (Milne Murray).

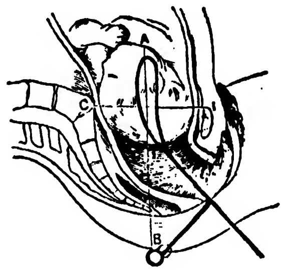


FIG. 718.
Hubert's Forceps applied at the Brim. A B, the axis of the inlet corresponds with the direction of traction, hence angle of error has disappeared. (Milne Murray).

brim is concerned, the problem is solved. The curved blades grasp the head at the best advantage, and the rigid traction bar applies the tractive force in such a way that the angle X (Figs. 711 and 714) disappears (Fig. 718). Thus the head enters the brim in the proper axis, and the forceps up to this point are Axis-Traction (Fig. 718). But now the head is in the cavity, the direction of the axis immediately begins to alter, but we are still dragging in the axis of the brim, hence we are no longer applying the traction to the best advantage. The instrument now ceases to be an Axis-Traction forceps, and re-adjustment of

the line of traction is necessary. But how is this to be done? The instrument offers no guide or hint, and again we have to fall back on individual judgment. Thus, theoretically perfect as an Axis-traction instrument as this is at the brim, it loses all claim to this at a lower level.

In 1877 Tarnier first announced the construction of his new forceps, but it was four years later when the permanent or improved pattern was described. His invention consists in the application of suitably curved traction-rods to the back of the blades by a joint, allowing antero-posterior movement (Fig. 719). These rods are exclusively used for traction, the ordinary handles being only employed for applying the instrument. The advantages claimed for such an instrument are:—(1) The head is caught in the best attitude; (2) The movable traction-rods

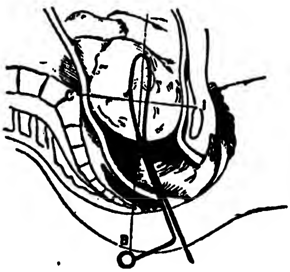


FIG. 719.
Diagram of Tarnier's Forceps at Brim. The traction-bar of Hubert's instrument is continued up by a rod which is fixed by a movable joint at the lower end of blade.
(Milne Murray).

allow of traction in the axis of the inlet; (3) As the head descends into the cavity, the application-handles of the forceps move forward in such a way as to indicate how the traction-rods are to be re-adjusted, in order to continue the traction in the direction proper to the plane of the pelvis through which the head is passing.

Or, put briefly, we have with the Tarnier instrument:—A, a proper grasp; B, a means of traction in the pelvic axis; C, a means of indication as to the axis of the pelvis wherever the head may be. It is of importance to analyse these claims, and see how far they can be conceded to the instrument under discussion.

A. **As to the Proper Grasp.**—The blades being curved, they come under the same conditions as the ordinary curved

forceps. These, as we have seen, give us the means of seizing the fœtal head to the best advantage, and in this respect Tarnier's instrument possesses the same advantage as the ordinary form. The entrance and descent of the head by the most favourable diameter are in no way interfered with.

B. **As to the Means of Proper Traction.**—This involves a study of the proper dimensions, curvature, and attachments of the traction-rods. So far as I am aware, this has not been discussed by Tarnier or any of those who have modified his instrument. Yet it is obviously a matter of vital consequence to the construction and efficiency of the instrument; and one has only to look for a moment at the instruments supplied by different makers—say of the Simpson-Tarnier model—to see the possibility of error and variation. Let us then consider the mechanical principle involved in the construction and attachment of the traction-rods.

1. Let us suppose we have a head about to enter the brim, and suppose we apply a pair of forceps whose blades, instead of being curved (like the ordinary instruments), are bent sharply at an angle. The line P V (Fig. 720) will represent the axis of such blades, while P R will represent the axis of the shanks and handle.

2. Let A B represent the axis of the inlet, which will also indicate the line on which traction must be made with the head at the brim. It follows, then, that the handle of the rods by which traction is made must be on the line A B, outside the pelvis. As the anatomical arrangement of parts renders the adaptation of a straight traction-rod along it impossible, we must adopt a modified shape of rod. Let the said rod spring from the angle P, run close to and parallel with the shanks P R, and then at a suitable distance, say S, curve backward until it crosses the line A B. At this inter-section the handle T must be fixed. With such a construction it is certain, so long as the rods P S and P R remain parallel, that traction will be in the line A B, just as if the rod were a straight one from A to B.

This may not appear obvious at first, but a mechanical illustration will make it clear. Suppose T P S (Fig. 721) is

a steel plate fixed by a link at P, and traction is made at T along A B, then the mere cutting out of a section of T S P along the dotted line will make no difference to the direction of the transmission of force from T if the remainder remains rigid.

3. Now, if the junction of the traction-rod at P is made rigid, we have simply the construction of Hubert's forceps;

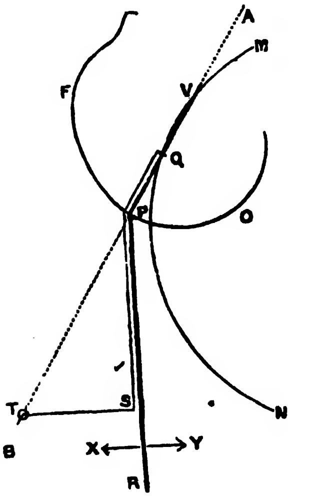


FIG. 720.

F O, fœtal head; M. N. curve described by middle point of fœtal head as it passes along canal; P V, blade of forceps; P R application handle; Q P S T, traction-rod; A B, line along which traction on T tends to draw fœtal head. (Milne Murray).

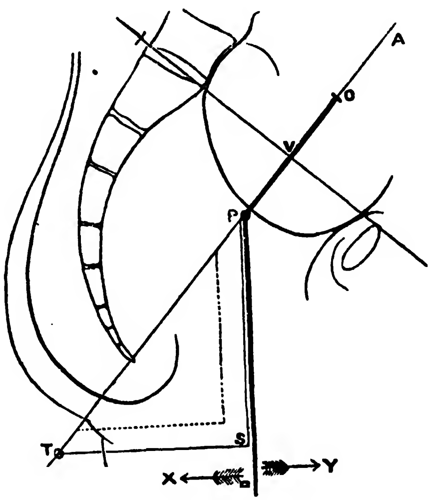


FIG. 721.

Mechanical illustration of previous diagram. (Milne Murray).

and as soon as we have cleared the brim, since traction should no longer be in the line A B, we have no means of knowing in what way we must now direct it.

4. But suppose the junction at P is made by a joint which permits of antero-posterior movements, the case is different. For now, as the advancing head enters the cavity the blades of the forceps will be under the influence of two forces.

(*a*) Supposing the blades are so firmly applied as to be immovable on the head, they will be carried along the curved axis with the head, and the handles will tend to move forwards in the direction of the arrow Y. and thus indicate a change in the line of movement of the head.

(*b*) But this movement of the blades and handles will be modified in amount by their being acted on by another force at the point P in the direction A B, assuming traction is still kept up in this direction. But this will not annul the influence of the first, so that a certain movement of the handles P R away from the rod P S will indicate that a change in the direction of descent has occurred, necessitating a change in the direction of traction. By now bringing the traction-rod P S T up to the handle P R until close to it, we are again in a position to apply the tractive force in the direction appropriate to the new position of the head relative to the pelvic curve.

5. But it is obvious that unless the blades grasp the head with considerable firmness, the force in the line A B will greatly tend to annul the directive influence of the head on the handles, tending to displace the lower end of the blade backwards round an axis piercing the tips of the blades,—it will tend, in fact, to displace the blades on the head.

6. But now, let us shift the hinge of the traction-rod to the middle of the blade Q (Fig. 720), bending the rod along the lower half of the blade. Traction at T will still act along A B, but this traction will have no tendency to interfere in any way with the directive influence of the head upon the blades and handles of the forceps.

Accordingly, with the rods hinged at Q, the application handles will act as a most sensitive index of the movements of the head in descending the pelvis, while at the same time indicating the direction of proper traction. This is, of course, a point of vital importance in the theory of the instrument, and it may be well to discuss it a little more fully.

Let F O (Fig. 720) represent the fœtal head, and M N the curve along which it will travel under the influence of the pelvic curvature during delivery by the forceps. Now let

us suppose that the traction-rod T S is attached, 1st, at P. Then as the head descends along M N the traction applied at T along A B will tend to displace the blade P V on the head backwards. For as the pelvic walls will guide the head along M N, the traction at T will tend to keep the blades P V in the line A B. There is thus an inevitable tendency for the traction-rod so placed to cause rotation of the forceps on the head, so that the handles will tend to move in the direction of the arrow at X. In this way, as has been already indicated, the attachment of the rods at P tends to diminish the sensitivity of the instrument as an index of the movements of the head in the pelvis. Now, 2nd, suppose the rods shifted up until attached to the tips of the blades at V. It will be seen that the condition of things is altered, for now traction at T along A B to V will be followed by a tendency to tilting forward on the part of the blade V P, and a corresponding movement of the handle R in the direction of the arrow Y. The influence of the head in carrying the blades and handle forward will be greatly increased, and out of all proportion to the effect of the pelvic curvature. Obviously, then, the attachment of the rods at either P or V would be a faulty construction, at the former the sensitivity of the handles as an index would be impaired, while at the latter the whole system would be obviously highly unstable, and there would be a tendency to exaggerate the influence of the pelvic curve. It follows, then, that there must be a point somewhere between P and V, at which the tendency of the traction-rods to interfere with the directing influence of the movement of the head on the handle of the forceps is nil; and that point must be one half-way between P and V, namely, Q, the point of the blade which lies against the centre of the mass of the fœtal head. It will be readily seen that when the traction-rods are hinged at Q, the slightest change in the direction of the movement of the head will make itself evident by the handles of the instrument R tending to move forward away from the traction-rod T S.

It follows, then, that for a theoretical arrangement such as this,—the blade of the instrument forming an obtuse angle with the handle, and being itself straight,—the maximum

sensitivity will be obtained by attaching the traction-rod to the centre of the blade. But an instrument with the blade P V straight as in the figure is obviously impracticable. It remains to be seen, then how we can construct an instrument in which the blade P V has a curve, as in the ordinary forceps, provided with traction-rods of proper construction, and attached at the point which will permit of the maximum efficiency of the instrument as a tractor and indicator being secured.

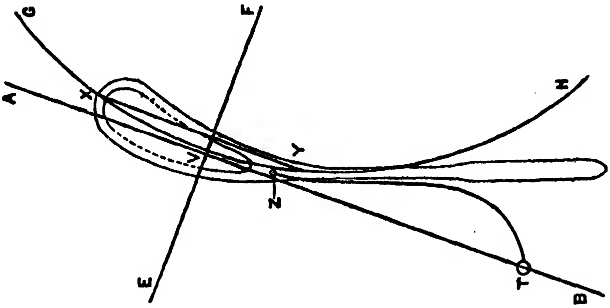


FIG. 722.

Mechanical construction of Tarnier's Forceps.
X, centre point of blade tip; Y, junction of blade and shank; XY, chord of arc of blade; XVY, arc of blade; EF, bisects chord at right angles; GXVYH, circle whose centre is on EF, and of which XVY is an arc; A B, tangent to arc at V; V, theoretical position for attachment of traction-rods; Z best practicable position for do.; ZT, traction-rod.

(Milne Murray).

Let the outline (Fig. 722) be a pair of curved forceps to which traction-rods have to be attached. Let Y be the point at which the curve of the blade joins the straight shank. Join the points X and Y (X being the centre point of the end of the blade). Bisect the chord X Y by a perpendicular E F. Describe a circle G X V Y H whose centre lies on E F, and whose periphery will pass through X and Y. Now draw a tangent A B to the circle G X V Y H at the point V, *i.e.*, where E F intersects it.

The conditions required, namely, maximum sensitivity and accuracy of direction, will be met if the traction-rod is

attached to the blade at the point V, and the rod has such a curve that the handle lies on the line A B.

If the rods are attached at the point V in X V Y, it is obvious that the force will be distributed symmetrically to the blade, and that the tendency to produce rotation of the blades on the head is zero. In other words, the point V corresponds to the point Q in Fig. 720. The movements of the application handles will accordingly be determined entirely by the change in direction of the head.

Unfortunately for the mechanical accuracy of this construction, the point V occurs in the centre of the fenestrum. Poullet and others have attempted to get over this difficulty by attaching the traction-rods to a bar crossing the fenestrum, and fixing the pivot there. The objectionable nature of this arrangement is obvious when we consider the use of the fenestrum. This bar adds a dangerous edge to the instrument, and might readily do much damage to nose, ear, etc.

But the disadvantage is not so great as it seems at first. The chord of the curve is 5.75 in. in ordinary forceps, and the position of V should theoretically be 2.87 in. from the lower end. The construction of A R Simpson's instrument allows it to be only 1.8 in. from the lower end. This fact no doubt diminishes the sensitivity of the instrument as an indicator of the direction of traction, but only to a certain extent. That is to say the point of insertion Z of the rods is sufficiently near the centre of equilibrium to permit the head to exercise far more directive force on the handles than the rods can, and this is practically all we want.

Now, as to direction of traction, it will be seen from the diagram that the fenestrum involves us in a slight difficulty too. But the defect here is even more insignificant than in relation to directiveness.

It will be seen that the tangent A B passes a little behind the stud of the traction-rod hinge Z, but the distance is so small as to make no appreciable difference in the direction. Were it desirable to obtain perfection in the matter, it could be obtained by broadening the lower part of the blade to take the stud a little further back.

It will be well now to recapitulate the points to be attended to in the construction of a pair of axis-traction forceps on the Tarnier principle.

1. The forceps must be of the Levret or Smellie type, *i.e.*, with straight handles and shanks and a well-defined "pelvic curve."

2. The fenestrum should be of such a shape and size as to leave a considerable part of the blade solid at its junction with the shanks.

3. The traction-rods must be united with a joint permitting of free antero-posterior movement only.

4. The upper part of the traction-rods must fit as close as possible behind the shanks and handle so as to save room, and avoid stretching of the tissues at the perineum.

5. The traction-rods must curve back for the attachment to the traction handle, so that when the rods lie close to the shanks, a line joining the traction-bar and the pivot will form a tangent to the middle point of the arc of the curve of the blades.

6. The traction-rod hinge must be attached to the blade as near the centre of it as the fenestrum will permit.

These may be regarded, I think, as the essential mechanical principles of this important instrument, and I wish now to ask attention to the manner in which I have attempted to carry these out in the instrument I have brought before the Society this evening, and in doing so I shall at the same time draw attention to some other matters of less vital importance, but which, I think, tend to add to its efficiency as an obstetric instrument.

The instrument is a modification of the Simpson-Tarnier model, which has, I think, many advantages over the French instrument. Lightness, compactness, and suitability to the left position are not its least advantages.

My instrument (Fig. 723) is made entirely of steel, there are no wooden handles—even the traction-bar is made of metal. The advantage of getting rid of the wooden handle is considerable.

1. The application handle being no longer used for traction, the massive handle of the Smellie forceps, so important in giving a good hold, is of no further use.

2. If any one who has used a pair of ordinary handled forceps for a year or two will take the trouble to unfasten the wood from the metal plate, he will find between the surfaces a much more potent argument than I can give in words for abandoning them. Owing to the wetting of the handles in cleaning the instrument, and the expansion of the metal plate in heating, a space is ultimately formed between the two, which is a receptacle for filth, putrid blood, grease, etc.,—a museum of septic matter.

The application handles are made smooth and light, and 6 in. in length. The ordinary Smellie lock is used, and the

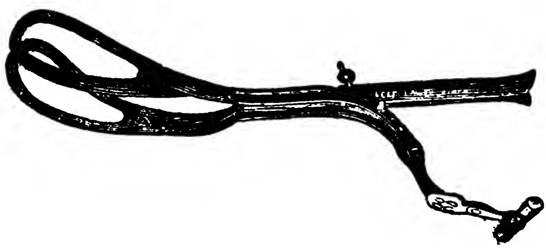


FIG. 723.
Milne Murray's Axis-traction Forceps.
(Milne Murray).

shanks are straight, strong, $2\frac{1}{2}$ in. in length, and .75 in. between their inner surfaces. The blades are 5.75 in. in length, measured along the chord of the pelvic curve (this arc has a radius of 7 in.). The termination of the arc joins the shanks, so that the axis of the instrument and the chord form an angle of 120°. The solid part of the blade measures $1\frac{3}{4}$ in. The fenestrum is 4 in. in length. The blades are kept in position by a fixation screw of the ordinary pattern, the butterfly nut being prevented from coming off by a pin driven through the upper thread of the screw. The traction-rods are hinged to the blades,. They lie on the outside of the solid part of the blade, against which they fit snugly. They are fixed by a pivot, which pierces the blade at right angles to their length.

This pivot is held by a small screw nut which fits flush into a counter sink in the inner side of the blade. It is of importance that this nut be screwed down to a shoulder on the pivot and work free of the countersink, otherwise the to-and-fro motion of the rods will inevitably loosen it and lead to inconvenience, and even disaster, if it come off inside the pelvis. The hinge of the traction-rods is 1.4 in. below its theoretical point, and .1 in. in front of the tangential line.

From these figures its error can be calculated. From their attachment the rods curve round the blades, and are bent at an angle so as to lie straight beside and a little to the outside of the shanks. One inch below the lock they are bent by an easy curve backwards, and terminate in two

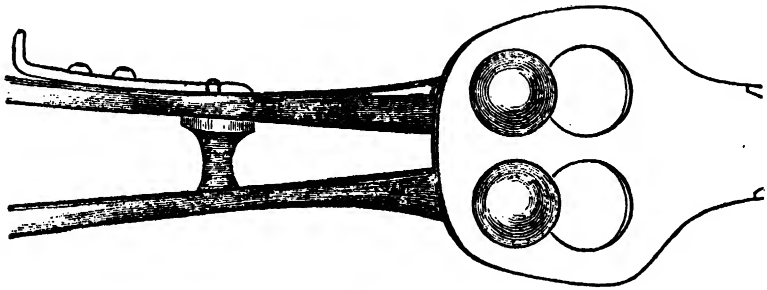


FIG. 724.
Milne Murray's Traction-rod Lock and Traction-bar Plate.
(Obs. Transac. Edin. xvi).

flattended surfaces, in which are inserted the traction-handle studs. About half way along the back curve is the traction-rod lock. This appliance (which formed a part of the model I described to the Society in 1881) is, I think, a device of some importance. It consists (Fig. 724) of a pin fixed to the lower traction-rod which enters a mortise on the upper, in which it is held by a simple bolt. Its object is to bring the two rods into one system, and make sure that the force of traction is equally distributed on the two blades.

The inclination of the flattened surfaces terminating the rods and carrying the traction-bar studs is a matter of essential importance. Its inclination must be such that the traction-bar plate when attached must be absolutely in the tangential line

of the curve when the rods are touching the shanks. This is the part of the instrument which is most likely to be bungled by makers, and it is one which, when faulty, vitiates the whole mechanism of the instrument. The angular measurements are of little use to makers, and there is nothing for it but to try each pair of instruments with the projection, and adjust the curve until it coincides.

The distance of the studs from the centre of the handles in these instruments is 3.5 in. The studs are square in section, with large heads. The traction-bar plate is attached by a couple of key-holes, and when drawn down should fit firmly without to-and-fro motion of any sort, and this is a detail which makers require much persuation to carry out. The traction-handle possesses a hinge joint giving lateral motion, and the bar is attached by a swivel.

From the foregoing study of the mechanical principles involved in the Axis-Traction forceps it is obvious that their efficiency depends largely on the accuracy with which these principles are followed in their construction. The somewhat complex nature of their construction renders it very easy for errors in their details to arise even in the hands of careful makers. This is especially likely to occur where the instruments are turned out in large quantities. While the practised eye can readily detect any essential error in their construction this is more difficult in the case of those less familiar with the details, and a serious error in the curvature of the rods may readily be overlooked. On this account it is well that a ready means for testing the accuracy of the construction of any instrument should be available. The following method is sufficiently simple, and will enable anyone before using an instrument to assure himself of its proper construction:—

A piece of paper about 18 inches square should be firmly stretched on a drawing board or other smooth surface. A pencil line should be drawn down the centre of the paper. Place the left blade of the forceps on the middle of the paper so that the shank coincides with the line already drawn, the hollow side of the blade being upwards. Trace an outline of the blade on the paper, holding the pencil perfectly vertical

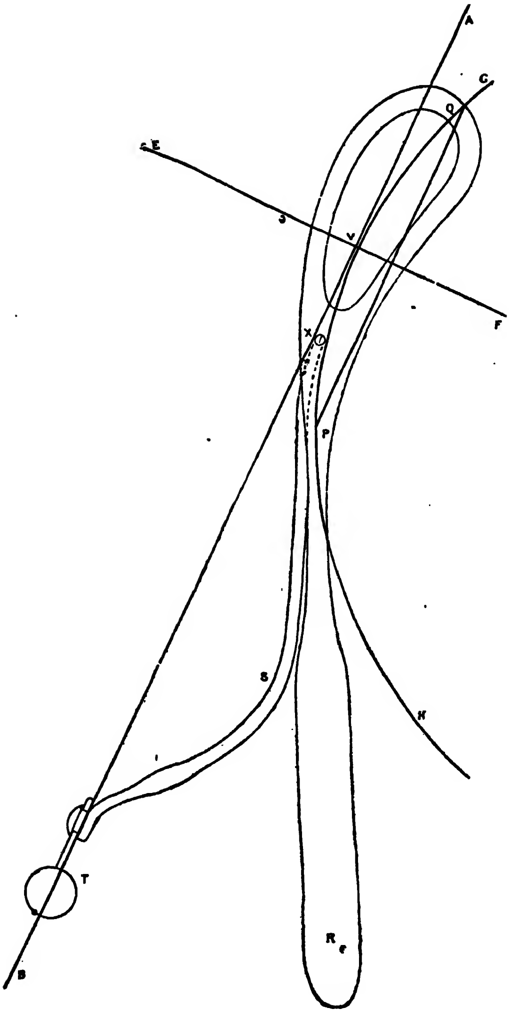


FIG. 725.
Mechanical Projection.
Milne Murray's Axis-traction Forceps.
Drawn ⅓ scale.
(Milne Murray).

in doing so. Mark the point at which the shank joins the curve of the blade, call this point P. Mark the centre of the tip of the blade; call this point Q. Join P Q by a straight line. This will form the chord of the arc which forms the middle of the curve of the blade. Bisect P Q by a line at right angles to it E F. Describe a circle G Q V P H whose centre lies on E F and whose circumference touches Q V P.

FIG. 726.

Diagram to illustrate the principle of Adjustable Axis-traction. The lines M^1, N^1, F^1 represent the inclination of the plane of the brim in **Justo-minor, Normal,** and **Flat pelves.**

The lines $M^2N^2F^2$ represent the direction of the axis of the brim in these pelves.

AB, axis of blade of forceps.

CD, horizontal limb of traction rod.

The points $M^2N^2F^2$ on CD, indicate the position of the traction handle when adjusted for traction through the planes $M^1N^1F^1$ in the axes $M,^2N^2F^2$ respectively.

It is obvious that if the pelvic canal were straight and the plane of the brim horizontal the proper line of traction would be along the axis AB and accordingly the greater or less the inclination of the pelvis and the plane of the brim, the greater or less must be the angle formed by the proper line of traction and the axis of the forceps AB. (Obs. Trans. Edin. XXI).

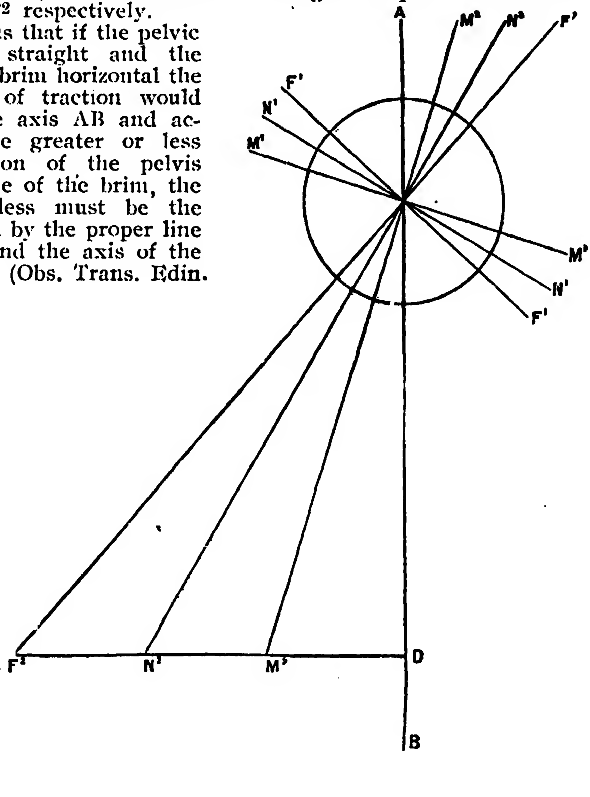


FIG. 727.

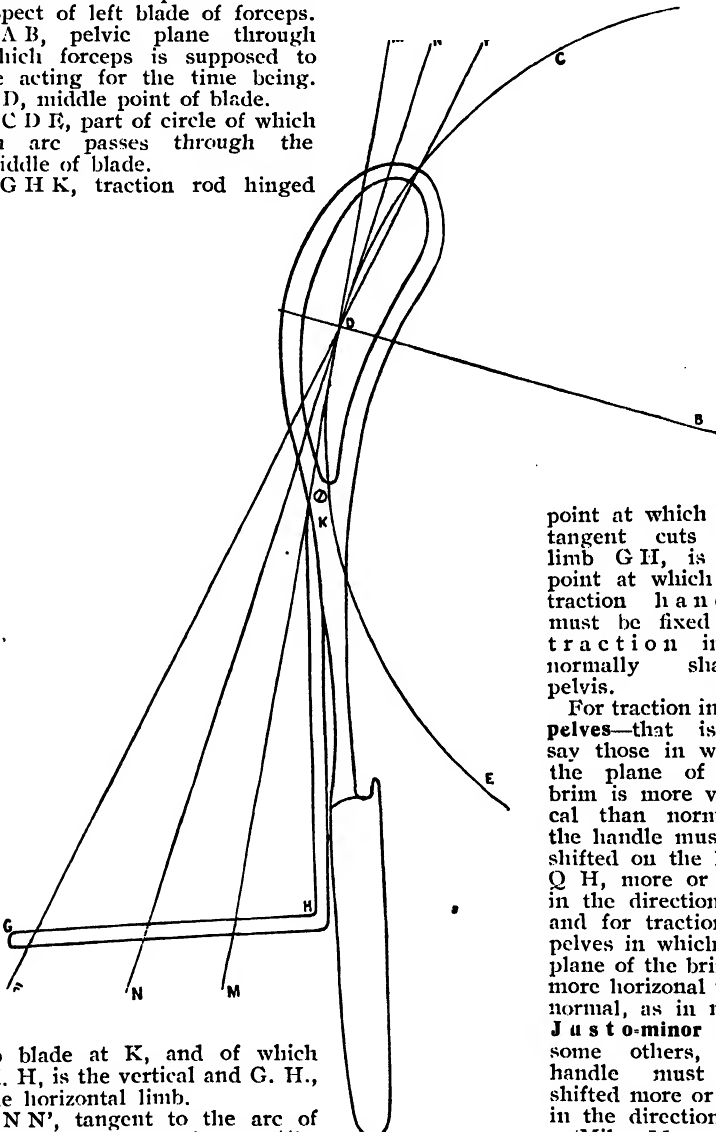
Diagram to illustrate construction of Adjustable Axis-traction Forceps.

The outline represents inner aspect of left blade of forceps.

A B, pelvic plane through which forceps is supposed to be acting for the time being.

D, middle point of blade.

C D E, part of circle of which an arc passes through the middle of blade.



G H K, traction rod hinged to blade at K, and of which K. H, is the vertical and G. H., the horizontal limb.

N N', tangent to the arc of the blade at the point D. The point at which this tangent cuts the limb G H, is the point at which the traction handle must be fixed for traction in a normally shaped pelvis.

For traction in **flat pelves**—that is to say those in which the plane of the brim is more vertical than normal—the handle must be shifted on the limb G H, more or less in the direction F; and for traction in pelves in which the plane of the brim is more horizonal than normal, as in most **J u s t o-minor** and some others, the handle must be shifted more or less in the direction M.

(Milne Murray).

The arc Q V P lies in the middle of the blade. Now draw a tangent A B to the circle Q V P at the point V. This will be parallel to the chord Q P. Now lay the blade on the paper in its original position, taking care that the points P and Q correspond precisely to their position on the forceps. If the traction-rods are properly constructed the stud will lie on the line A B when the rod lies close to the shank.

It will be found that the circle G Q V P H has a radius of about 7 inches; but as it is difficult to obtain forgings which are always identical, this radius may vary somewhat. This variation does not materially affect the efficiency of the instrument provided it is kept within reasonable limits, and the construction given will enable anyone to determine the proper curvature of the rods for any instrument, whatever the curvature of the blades may be.

Figure 725 will show accurately how this projection is made.

Milne Murray read a paper on March 11, 1896, before the Obs. Soc. of Edinburgh "On forceps with adjustable Axis-Traction."

It will be readily seen that an instrument which is properly speaking, an Axis-Traction forceps in a normal pelvis cannot be so in an abnormal one, unless some means are provided by which the line of traction can be varied to suit the requirements of the altered canal.

With a view to meeting this difficulty Milne Murray devised this new forceps with adjustable Axis-Traction.

"The forceps itself is identical in all respects with the instrument which has been in use for some years. It is made entirely of steel and I have kept the same curvature of blades, *viz.*, one of 7-inch radius. So far as the pelvic curve is concerned, the curvature is of little consequence in relation to the variation in pelvic type. The main object is that the line of traction shall pass through the middle point of the sub-occipito-bregmatic plane in vertex cases where flexion is part of the mechanism at the brim and through the middle point of the occipito-frontal plane where extension occurs at the brim."

The traction-rods are jointed to the blades in the usual way as near the fenestrum as possible. They then run down close to the shanks and along the back of the handles and at a point half-way down they then turn back at a right angle for a distance of nearly 4½ inches. The horizontal part of these rods is oval in section and the upper one is divided into distances half an inch apart which are numbered 0 to 7.

The handle is applied to these horizontal rods by a block pierced to allow them to pass through. This block can be fixed in any position by a pinching screw, which is secured in such a way that it cannot slip out. To this block is fixed the handle by a joint which permits motion in a plane parallel

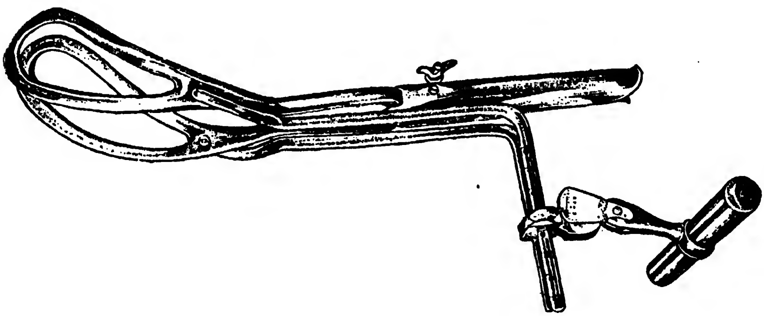


Fig. 728.
Milne Murray's Adjustable Axis-traction Forceps.
(Obs. Trans. Edin. XXI).

to the rods. This motion is necessary to allow the handle to fall into proper line of traction for each position on the rods. To the pin of the hinge-joint is fixed a sector, which moves with the handle. The periphery of the sector has marked on it the position proper to it for each position of the block of the rods. Against one of these marks is placed the word "normal". When the handle is adjusted to this mark, the instrument is, as regards construction and efficiency, an ordinary pair of Axis-Traction forceps.

In justo-minor pelvis, it will be proper to fix the block at a mark nearer the application-handles than the "normal" one. In flat pelves, the handle must be shifted backwards along the traction-rods.

The following advantages may be claimed for these instruments :—

1. Simplicity of construction and manufacture.

2. Simplicity of parts and ease with which they can be cleaned.

3. Ease of application.

4. Wide range of action.

The essential advantage associated with the pelvic curve of the ordinary forceps, is that it grasped the head in such a way that in an occipito-anterior case it tended to favour or to increase flexion. This very virtue of the pelvic curve in relation to occipito-anterior cases become a more or less manifest vice in relation to occipito-posterior cases by undoing

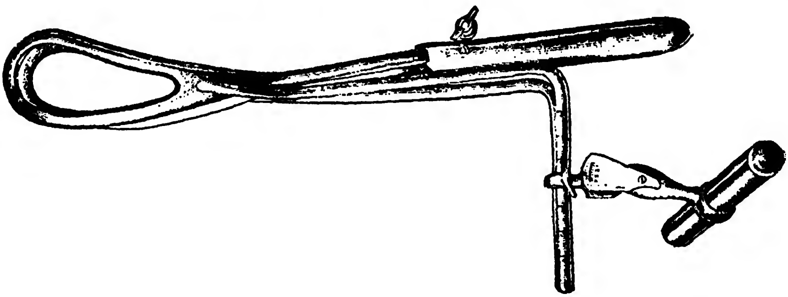


Fig. 729.
Milne Murray's Adjustable Axis-traction Forceps.
(For delivery in occipito-pesterior cases).
The blades are bent so that the pelvic curve has a radius of 14 inches as against 7 inches in the ordinary forceps.
(Obs. Trans Edin. XXI).

flexion. It seems essential then, that some modification of the pelvic curve must be made, if forceps are to be employed for the purpose of developing or increasing flexion in occipito-posterior cases. The ideal instrument for such cases will be one which acting in the axis of the pelvis seizes the head in such a way as (1) to secure a firm hold; (2) to increase flexion; (3) to favour or at least not to interfere, with normal rotation. The end has been attained by the simple modification of a flattening of the curve of the blades to a radius of 14 instead of 7 inches. By this means the head is caught sufficiently

near the parietal bosses to secure a perfectly firm grip which increases in certainty the more the occiput descends. Further the flattening of the curve brings the blades to bear on the head in such a way as to depress the occiput, while of course the swivel action of the handle favours the forward rotation as descent occurs.

Milne Murray improved his forceps further and showed on February 10, 1897, before the Obstetrical Society of Eidnburgh his (*a*) Axis-Traction forceps with separable traction-rods, and

(*b*) Adjustable Axis-Traction forceps with a new modification of attachment of traction handle.

Am improved bolt of Axis-Traction forceps, was shown before the Obstetrical Society of Edinburgh on January 11, 1899.

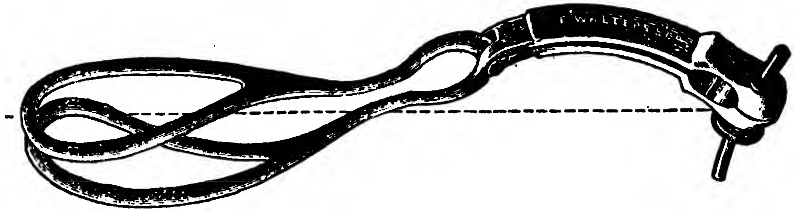


FIG. 730.
Taylor's Forceps.
(Lancet 1892, ii).

1892. Taylor.

G. Taylor described his forceps thus:—

"The instrument is made entirely of steel (plated) and the surface is perfectly smooth, throughout affording no nidus for the lodgment of disease germs, while the whole instrument can be plunged in boiling water or otherwise purified. The blades are of the usual shape. A Barnes' foramen is placed at the lock for use if necessary, when the head is at the outlet. Beyond the lock, there is a perineal curve, exactly counteracting the pelvic curve of the blades. Longitudinal handles are abandoned. At the extremity of the perineal curve (where it meets the axial line), there is a movable transverse

traction-rod and a second foramen (between the parts of the forceps) to receive the middle finger, thus forming a very comfortable hold for the operator. The traction-rod also secures the two halves of the forceps, when in position being provided with two lateral rings, one fixed and one movable (the latter running freely by screw action), so as to embrace the extremity of the forceps. The forceps is about an inch longer than Sir J. Simpson's. This forceps, while as efficient as the usual Axis-Traction forceps, is less complicated and less likely to retain septic material. The fault of forceps with a perineal curve (without added tractors) has generally been that they have been provided with longitudinal (wooden) handles, ignoring the fact that traction can only be efficiently applied

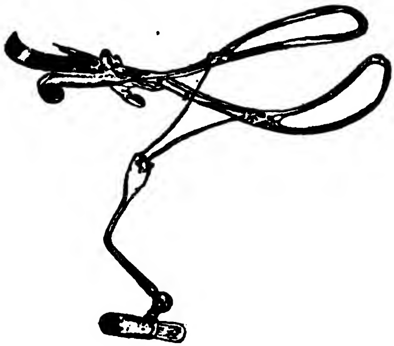


FIG. 731.
Herff's Forceps.
(Verh. Deut. Ges. f. Gyn. X).

at one point—*viz.*, where the perineal curve meets the axial line. To sum up, I claim for the forceps that it is (1) efficient, (2) aseptic, (3) simple in its mechanism and (4) comfortable for the operator."

1892. Herff.

Herr *v.* Herff of Basel modified the Axis-Traction forceps, a diagram of which appeared in his "Geburtshilflicher Operationslehre" (1894). The model is a combination of the best features of French, English and German forceps. It possesses

the blades of Tarnier, the lock of Brunninghausen, the handle screw of Tarnier, the easy transverse locking of Simpson and the best features of Naegele's forceps. (See Gonner).

1892. Gardner.

William. S. Gardner of Maternity Hospital, Baltimore, is of opinion that many of the forceps now in use are made with a cephalic curve so slight that it is necessary to approach the blades very closely in order to grasp the head firmly and prevent slipping. In this way the head of the child is compressed. While the compression of the head decreases one diameter, it increases the other diameters. "To meet these conditions I have constructed a cephalic curve which differs considerably from any now in use. The whole length of the blades in a straight line that is affected by the cephalic curve is 6½ inches. When the blades are closed, they approach at the tips to within ¾ inch of each other. At the widest part, which is 3 inches from the points the blades are 3¼ inches apart. At the point where the cephalic curve proper stops the blades are 1½ inches apart. The curve from this point to the widest part of the blades is the arc of a circle whose radius is 4⅛ inches. The remainder of the curve is the arc of a circle whose radius is 7 inches.

Another point which improved the grasping power of the forceps is to have the lock as far from the point of the blades as it can be placed without so much increasing the length of the forceps as to make them troublesome to carry about. When the distance from the point of the blades to the lock is short, the blades diverge rapidly when they are opened and the grasping power is soon lost. On the other hand when the blades are long the grasping portion of the blades can be separated very widely without losing their power to retain a globular body between them. By this increased cephalic curve and the long blades I have endeavoured to solve the question of how to obtain a firm grasp of the head without compression.

The traction handle is so placed that the force is exerted along that chord of the arc of the pelvic curve of the instru-

ment extending from the point of greatest resistance to the point of attachment of the rods. The handle is attached to the perpendicular portion of the traction-rod, so that its centre falls on a point on an extension of this line and Axis-Traction is obtained.

There is a joint at the angles of the traction-rod which allows the forceps to rotate upon its own axis without changing materially the point at which the force is exerted. This joint allows rotation of the head as it descends and in

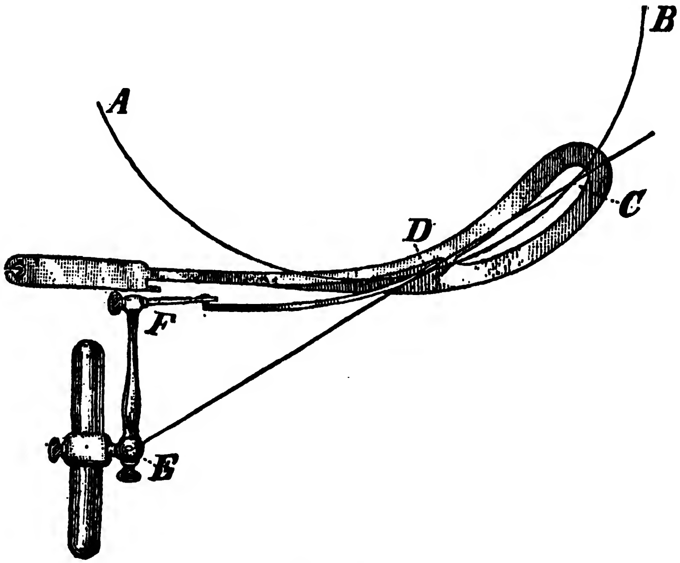


FIG. 732.
Gardner's Axis-traction Forceps.
(Amer. Jour. of Obs. XXVI).

occipito-posterior positions it allows the complete rotation of the occiput to the front.

In the diagram, the arc A-B is an arc of a circle whose radius is 7 inches which is the arc which most nearly corresponds to the direction taken by the head of the child in its progress through the practically immovable portion of the average pelvic canal. The line C-D is the chord of that arc from the point of estimated greatest resistance to the insertion

of the traction-rods. D E is an extension of this line until it falls upon the point at which the force is applied. F is the joint at the angle of the traction-rod.

The instrument is made without fixed joints, so that each piece can be cleaned separately."

1892. Horrocks.

Dr. Peter Horrocks showed before the Obstetrical Society of London a pair of forceps, made of metal throughout, and free from all indentations. The maker's name was not stamped on the instrument.

Dr. Peter Horrocks qualified in medicine in 1877. He became obstetric physician to Guy's Hospital and Lecturer on obstetrics and diseases of women, Guy's Hospital Medical School of London.He contributed a large number of papers in medical Journals.

1892. Heestenberghe.

No description or diagram of this forceps is available.

1893. Tournay.

The original reference to this "Mixte forceps", is not available.

1893. Aitken.

Dr. D. W. Aitken constructed a pair of new midwifery forceps. The special points in regard to them are, according to the inventor, that (1) the traction-rods are exactly in the line of traction. In former patterns, owing to a desire for strength, the rods were attached somewhat out of the direct line. But when it is considered that the weakest point is the attaching hook of the traction-rod, it will seem to be unnecessary to add so much breadth and thickness to the blade itself. It will be found on examining the forceps that, even now, sufficient substance of metal exists to resist any amount of strain the rods are capable of enduring. (2) Instead of the ordinary lock the blades are fastened by means of a vertical

plate which rises from the surface of the lower blade in the situation of the old lock. This plate in transverse section has the shape shown in the figure; it is received into a recess in the upper blade, when the two blades are in apposition a fast running screw with a large head is applied through as a slit in the upper blade into the hole in the vertical plate and screwed home. The vertical plate prevents all lateral movement while the screw binds the blades firmly together. The slit in the upper blade is elongated so as to allow the screw to meet the screw-hole vertically even when the blades are at an angle.

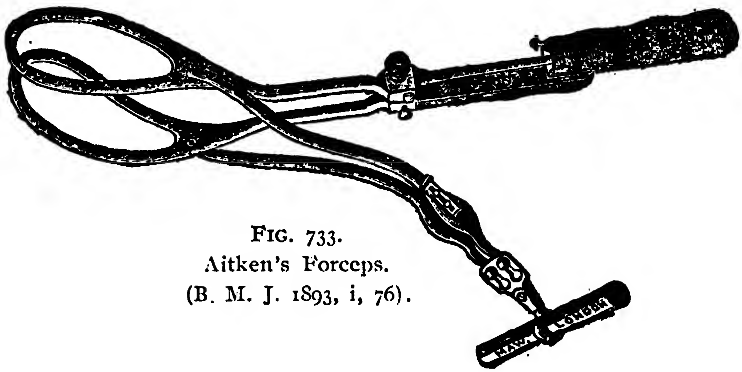


FIG. 733.
Aitken's Forceps.
(B. M. J. 1893, i, 76).

The advantages claimed for this method of fixation are: (1) It allows the upper blade to be applied much more easily than in former methods, in fact it can be inserted first. There is no necessity either for the somewhat tedious and objectionable manœuvre of bringing the upper blade from the lower to the upper wall of the vagina or for the alternative, equally disagreeable, of projecting the buttocks far over the edge of the bed. (2) When the blades are inserted they merely have to be placed one on the other. There is not the difficulty and slight danger of nipping the soft parts entailed by the depression and locking the upper blade of other forceps. (3) The handles can be removed after the forceps are in position. During manipulations the operator has the advantage of a good firm handle which balances the upper part of the blade. When the instrument is ready for traction the ordinary handles hang like a heavy weight on the end of a lever; to obviate this the

handles in these forceps have been made hollow to receive the slender rods which, when the handles are slipped off, remain to act as pointers.

This function has been well demonstrated by Dr. Milne Murray in his article on the Axis-Traction forceps. The movable handles are kept in position as follows: A narrow thin elastic plate of steel lies in a groove made in the length of the handle. This plate is furnished, as shown in the figure, with a tooth, which is received into a small hole which runs through the central part of the blade. When it is desired to detach the handle a small pin with a button head, which runs through the above-mentioned hole, is depressed by the thumb so as to meet the tooth and push it from its socket. As the pins of both blades are quite close together they can be depressed simultaneously and so the two handles can be readily slipped off together. The lightness of the remaining rods renders them capable of acting as true indicators, not only in the horizontal but also in the vertical direction, for there is manifestly, with such a weight as that of the ordinary handles, a tendency to permit the line of traction to fall below the horizontal, thus altering the diameter of the fœtal head.

In order to secure complete asepsis the whole instrument has been made of steel, though owing to the perfect fitting of all the parts it is scarcely possible for dirt to become deposited in any recess; yet to make assurance doubly sure the spring plates are fastened with screws and the case is fitted with a small screw-driver so that even they can be removed and cleaned.

1893. Cameron.

These Axis-Traction forceps are specially adapted for use in cases of marked contraction of the pelvis, even as small as three inches. The blades are marked A for anterior and P for posterior blade. The anterior blade is applied first and then the second is slipped over its handle. When in position the anterior blade is behind the symphysis pubis and the posterior in front of the sacrum so that the head is thus

grasped upon its lateral aspects. The handles are fitted with an Axis-Traction rod which is at once simple and most effective.

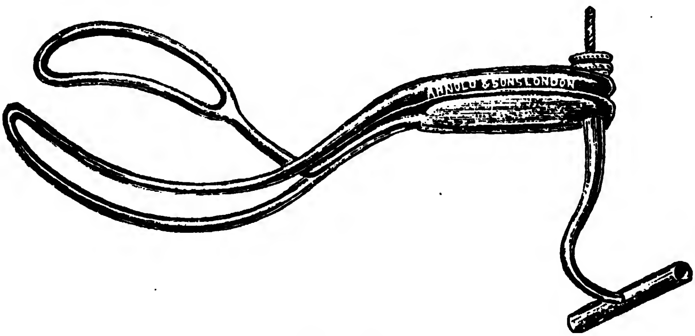


FIG. 734.
Cameron's Forceps.
(Arnold and Sons).

1893. Arnold.

Messrs. Arnold and Sons, surgical instrument makers, modified Barnes' long forceps, by introducing a joint in the shank of each branch, thus making the forceps, extremely portable. (See fig. 735).

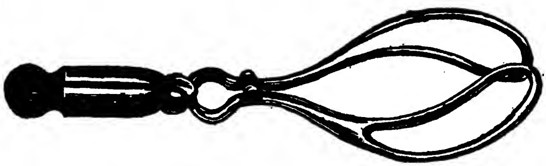


FIG. 735.
Arnold's folding Barnes' Forceps.
(Arnold and Sons).

1894 (?). Dauber.

John Hy. Dauber received his medical qualification in 1890. He was Assistant Physician, Hospital for women, Soho.

His Axis-Traction forceps is illustrated in Arnold and Son's catalogue. (See fig. 736).

1894. Dimant.

E. B. Dimant describe a new modification of the obstetric forceps. The description and illustration is not available.

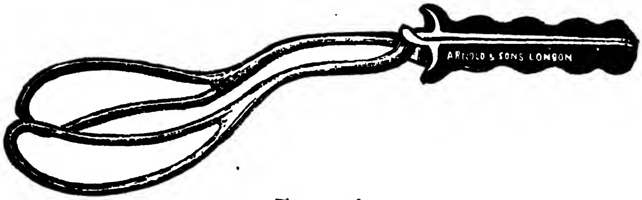


FIG. 736.
Dauber's Forceps.
(Arnold and Sons).

1894. Hamilton.

Dr. Hugh H. Hamilton devised a clamp for the obstetric forceps, which accommodates itself to any forceps. If moved and fixed toward the handles, it can be made to compress the

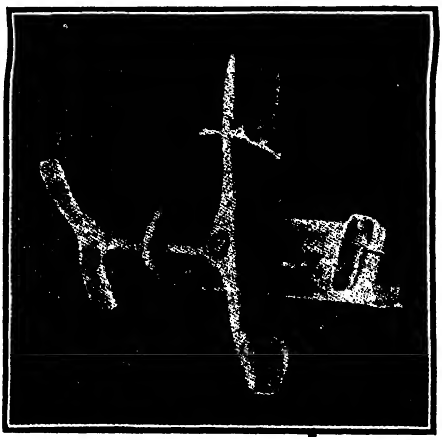


FIG. 737.
Hamilton's Clamp for Forceps.
(Annals of Gyn. and Pæd. viii).

head. It relieves the hand from prolonged grasp. It weighs 3 ounces, measures $3\frac{1}{2} \times 1\frac{1}{4}$ in. It is upon the principle of the "gum-spring vise" furnished with the rifles in the war of 1861.

1894. Dewees.

Dr. William. B. Dewees of Salina Kansas, presented a communication on a new Axis-Traction forceps, at the meeting of A. A. of O. & G. held in September, 1894.

The dimensions of the forceps were: Length 11 inches; length from lock to tip of blades 9 inches, length of perineal curve 5 inches; length of handle 4 inches; greatest width between blades when closed 2¾ inches; width between tips of blades when closed ¾ inch, weight 16 ounces.

The advantages claimed for the instrument are:—(1) Axis-Traction is perfect, easy and simple from the brim to outlet. (2) Head is delivered with the minimum amount of force. (3)

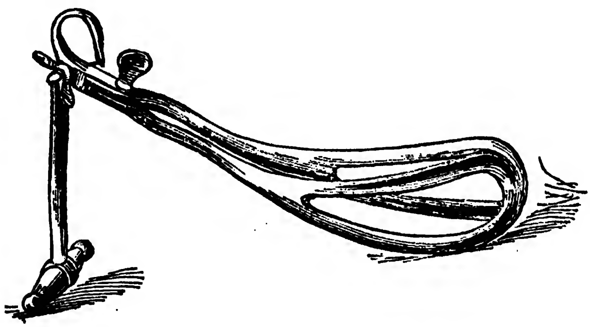


FIG. 738.
Dewees's Axis-traction Forceps.
(Tr A. A. O. and G. VII).

By means of the set-screw, with its scales, the blades can be definitely fixed upon the children's head during uterine contraction and as readily released during the interims. (4) It is easy of application and is an effectual tractor and compressor. (5) It is an aseptic economic, safe, efficient, and uncomplicated instrument.

1894 (?). Cullingworth.

Charles James Cullingworth was obstetric physician, St. Thomas's Hospital, London. He was the author of numerous papers on obstetric and gynæcological subjects. He

became President of the Obstetrical Society of London and received honorary distinctions from various foreign obstetric societies.

For an illustration of Cullingworth's Axis-Traction forceps, see fig. 739.

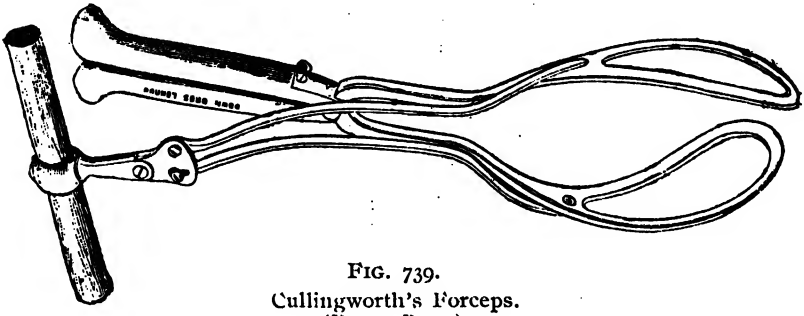


FIG. 739.
Cullingworth's Forceps.
(Down Bros.).

1895. Jewett.

Charles Jewett (see 1885) presented before the Brooklyn Gynecological Society a model of Axis-Traction forceps which was based upon Murray's projection. He located the stud from which traction-rods pulled, at a point which fell within a line

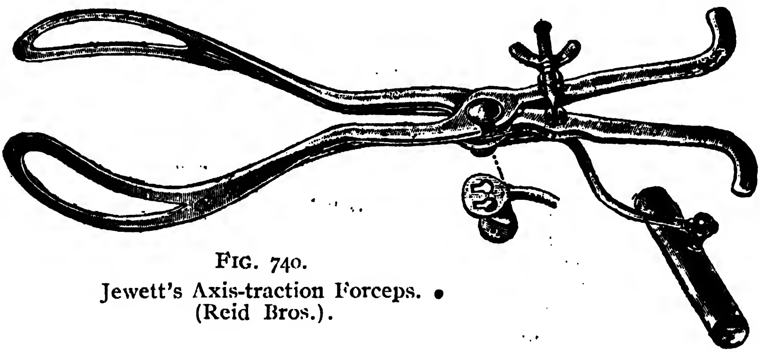


FIG. 740.
Jewett's Axis-traction Forceps.
(Reid Bros.).

which is tangent to an arc of a circle described upon a perpendicular line bisecting a line drawn between the centre of the tip of the blade and the point on the forceps blade where the pelvic curve begins. He preserved the pelvic and cranial

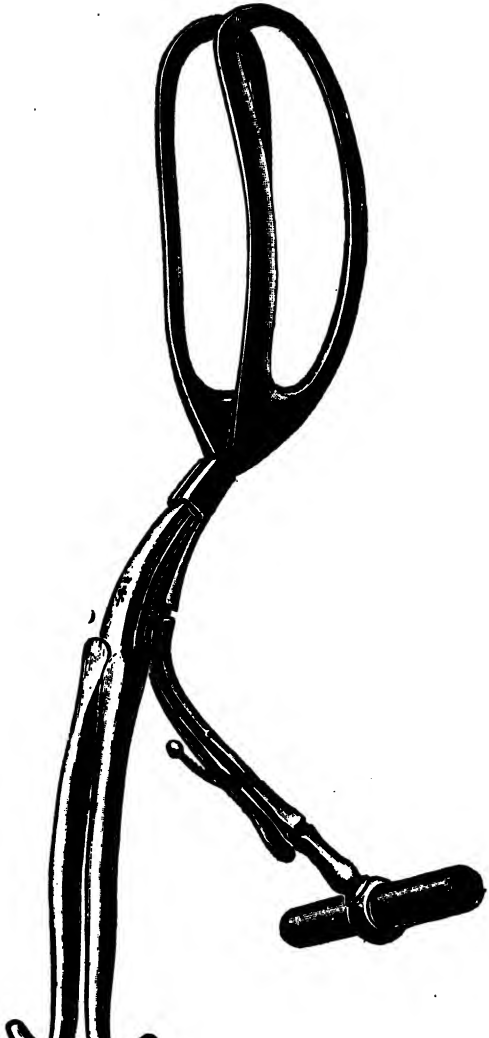


FIG. 741.
Cole's Axis-traction Forceps.
(Kny-Scheerer Corp.).

curve of the Tarnier instrument and the fixation screw; but he substituted the half Smellie for the button lock. The attachment of the traction-bar to the rods is so arranged as to permit less mobility at that point than in most other instruments.

1895 (?). Cole.

Cole's Axis-Traction forceps is illustrated in Kny-Scheerer's catalogue. (See fig. 741).

1895 (?). Wood.

Wood's forceps is mentioned in the catalogue of the Medical Supply Association. It is not illustrated.

1895 (?). Shoemaker.

Dr. C. A. Shoemaker constructed a short pattern forceps with curved corrugated handles. (See fig. 742).

FIG. 742.
Shoemaker's Forceps.
(Sharp and Smith).

1895 (?). Swedish.

The Swedish forceps is illustrated in Jetter and Scheerer's catalogue. (See fig. 743).

1895 (?). Stephenson.

This is a forceps with short stubby handles. (See fig. 744).

1895 (?). Lees.

Lees' forceps is mentioned in Mayer and Meltzer's catalogue but is not illustrated.

1895 (?). Pearse.

Pearse's instrument with a perineal curve is illustrated in Arnold and Sons' catalogue, in which is quoted the following description from the British Medical Journal:—"It possesses

FIG. 743.
Swedish Forceps.
(Jetter and Scheerer).

FIG. 744.
Stephenson's Forceps.
(Jetter and Scheerer).

all the powers and advantages of the traction forceps without the unnecessary and complicated addition of the separate tractors. By giving a large perineal curve to the shank of

the ordinary long forceps, I bring the handles back into the axis of the blades. Traction can be exercised in the right direction while the curve prevents any undue pressure on the perineum." (See fig. 745).

1895 (?). Kufferat.

This instrument is illustrated in Jetter and Scheerer's catalogue. (See fig. 746).

1895 (?). Knox.

Knox's Axis-Traction forceps is illustrated in the surgical instrument catalogue of Traux Greene and Co. of Chicago. It is also referred to in Parvin's obstetrics. (See fig. 747).

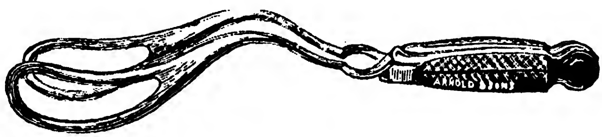


FIG. 745.
Pearse's Forceps.
(Arnold and Sons).

1895 (?). Wales.

The instrument (see fig. 748) embraces the following points of construction: Long curved blades with handles correspondingly curved so as to secure parallel Axis Traction and knot at end of handle to prevent slip: also with joint allowing enough *lateral* lock play to admit of automatic adjustment to cranium. I have found this instrument unequalled for facility and safety of application on *back* or *side*, reach, grasp, and economy of force" (Lancet).

1895 (?). Williamson.

For an illustration of this instrument, see fig. 749.

Fig. 746.
Kufferat's Forceps.
(Jetter and Scheerer).

1895 (?). Prendergast.

The following description is reproduced from Charles Lentz and Son's catalogue.

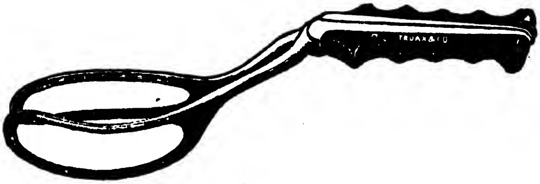


FIG. 747.
Knox's Forceps (Axis-traction).
(Tranx and Co.).

"The need of an instrument which will efficiently carry out the great advantages of the principles of Axis-Traction in

FIG. 748.
Wales's Forceps.
(Arnold and Sons).

the least complicated manner has led to the construction of the forceps as shown in fig. 750.

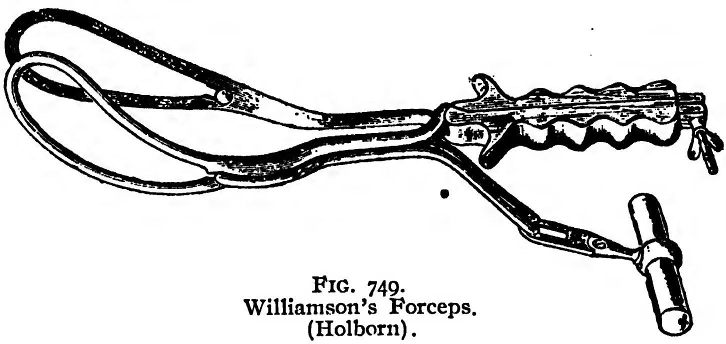


FIG. 749.
Williamson's Forceps.
(Holborn).

For specific reasons, the lock and cephalic portion of the blades are made after the Elliott model. The length of the

forceps and the direction of the traction appliance are proximately the same as those of the Tarnier; instead of the wooden handles, as in the latter instrument, aluminum is used for their construction.

When the blades are in position, they may be approximated to the presenting parts in a most practical way by means of a transverse screw, moving in a swivel joint at the end of the handles, and not at or just below the lock as in other forceps. The traction rods can be speedily secured to the forceps through the lower extremities of the fenestræ. The handle of the Axis-Traction may be easily attached to the rods.

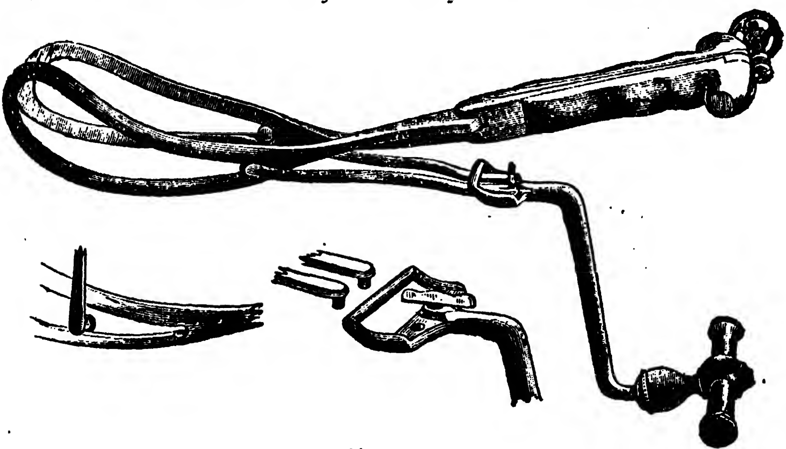


FIG. 750.
Prendergast's Forceps.
(Charles Lentz and Sons).

A ball and socket joint connected with the Axis-Traction handle, allows lateral and complete rotatory motion of the forceps.

The simplicity of its mechanical construction does away with many objectionable features of the recognized instruments of the day, and admits of the forceps being readily used either with or without the Axis-Traction attachment. All parts can be rendered thoroughly aseptic."

1895. Fisher.

R. W. Fisher described a new Axis-Traction forceps.

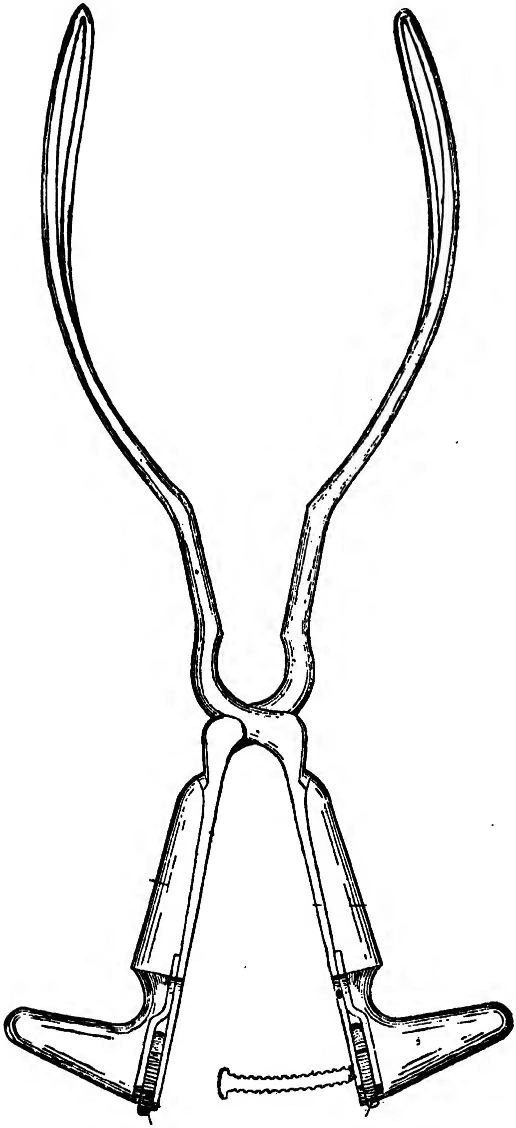


FIG. 751.
Bourke's Lock for Forceps.
(Bri. Gyn. Jour. II).

1895. Stewart.

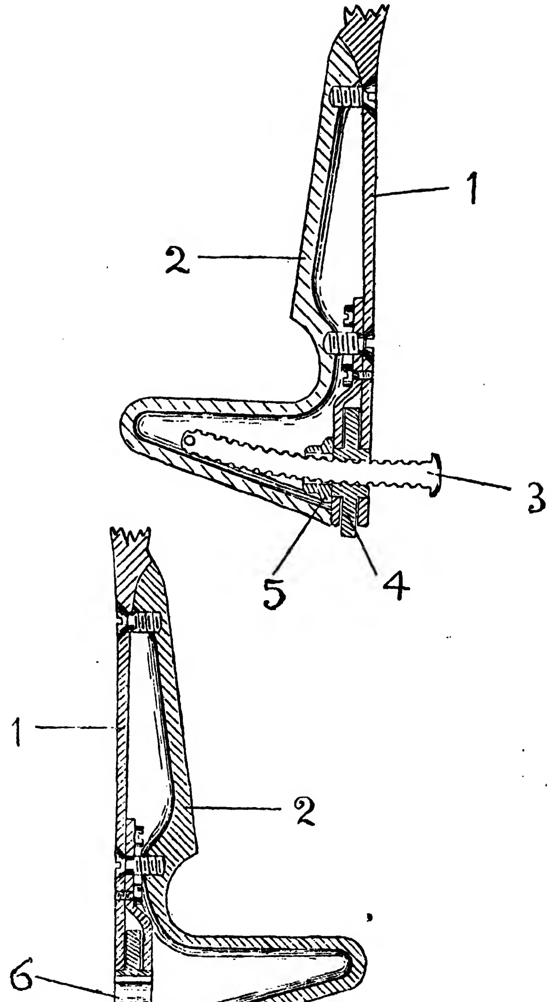
Dr. Rufus Stewart presented, before the Philadelphia Obstetrical Society on October 3, 1895, his modification of Tarnier's traction forceps. The special feature of this instrument is the introduction of a craniometer for measuring the biparietal diameter of the child's head *in utero*. This has been done by having a bar attached to one handle and crossing the other, and divided off, so that when the handles are separated the divisions on the bar will represent the extent of the separation of the blades when applied to the sides of the child's head. Stewart used the screw bar of the Tarnier forceps for this purpose having the upper side flattened and divided on its surface accurately. No illustration of this instrument is available.

1895. Bourke.

Dr. Edmond McW. Bourke devised a new lock for forceps which consists of a flat-racked bar which can be propelled from one handle to the other by turning a small wheel through which the bar passes. The wheel is inserted in the handle and the hole in its centre is a screw. The bar by the continued action of the wheel can be made to pass to and enter an oblong opening in a similar wheel inserted in the opposite handle and by a half turn the head of the bar can be screwed into a hollow in the handle. The alteration Dr. Bourke makes in the forceps is merely extending the end of the handles about one inch to allow of the bar being retained and the insertion of a small wheel in each which projects just sufficiently to allow of its being turned by the finger and thumb. By the use of the bar we can regulate compression and also have a perfect lock which can be freed by a half turn of the wheel which is inserted in the opposite handle to that from which the bar projects. This lock can be put on any existing forceps and does not interfere with its balance. The instrument was shown at the British Gynæcological Society on April 11, 1895.

1895. Penoyee.

See fig. A. page 664.



FIGS. 752-53.
Bourke's Lock for Forceps.
(Bri. Gyn. Jour. II).

1896. Mackness.

Dr. G. Owen C Mackness showed before the Obstetrical Society of Edinburgh on May 13, 1896 a modified Axis-Traction forceps.

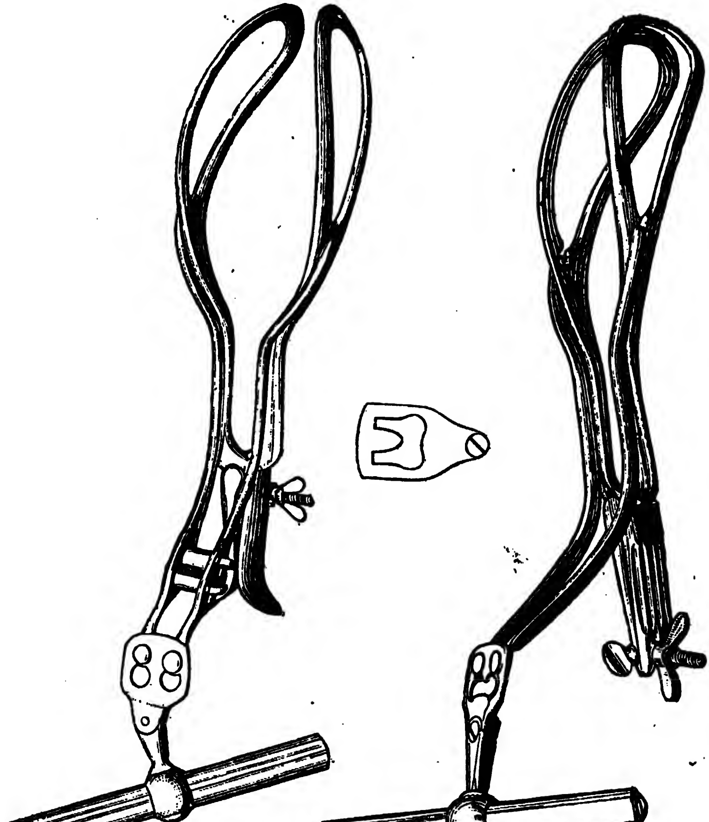


FIG. 754. FIG. 755. FIG. 756.

FIG. 754.—Mackness's Forceps. (First Model). (Obs. Trans. Edin. XXI).
FIG. 755.—Plate of traction handle cut away.
FIG. 756.—Mackness's Forceps (Second model). (Obs. Trans. Edin. XXI).

"The modification consists of a shortening of the handles from 6 inches to 3 inches. The advantages of the shortened handles are as follow:—(1) The forceps are far lighter less

cumbersome and more portable. (2) They are easily manipulated when forceps have to be applied with the patient in a confined space. (3) In occipito-posterior cases, when rotation takes place during traction on the forceps, the short handles do not catch on the thigh of the patient. (4) As the handles are shortened, the centre of gravity of the forceps is brought much nearer the points of the blades, *i.e.*, nearer the point where the power is applied to the fœtus in exerting traction and the balance of the forceps is thus much improved.

After delivery of the head of the fœtus by Axis-Traction forceps there is often great difficulty in removing the traction-handle from the rods. This is due to the large size of the fœtal head or to the fact that a normal head has been caught in a long axis, *e.g.*, in a case of flat pelvis; the blades of the forceps are then widely separated, causing an approximation of the ends of the rods and a consequent jamming of the buttons in the slots of the handle. To obviate this, I at first used two catches a short distance apart, on the rods, so as to keep the rods parallel whatever the distance apart of the points of the blades. Further, these catches consisted each of a button passing through a slit and turning so as to be retained in position (fig. 754). This arrangement works well and can easily be rendered aseptic; its only drawback is that when the fingers are slippery the buttons are sometimes difficult to turn, a drawback that could, however, be easily obviated by roughening the buttons. I found however that there is no real need for any catch at all if the plate of the traction-handle is cut away as in the other forceps (fig. 755), so that however much the buttons may be approximated by the separation of the points of the blades yet they can always slip out quite easily.

The ordinary lock at the side of the handles has been shifted to the end of the handle, where it is fixed by a removable pin, so that it can easily be taken off and cleaned. The end of the handle is so shaped that the screw will fold back and thus less room is taken up in carrying.

I have had these forceps (fig. 756) made with detachable rods, which easily slip into position and on being turned

round are retained by a button. The angle at which this button is fixed to the rod and the direction of the slit has been carefully worked out, so that, the rod does not slip out while the forceps are being applied. The forceps are thus much less bulky, more readily carried and easy to clean.

The forceps have thus handles only 3 inches long, roughened so that they do not slip in the hand; lock at the end of the handles and removable ; no lock to the traction-rods but the plate of the traction-handle cut away as shown. The traction-rods may be made removable for convenience in carrying."

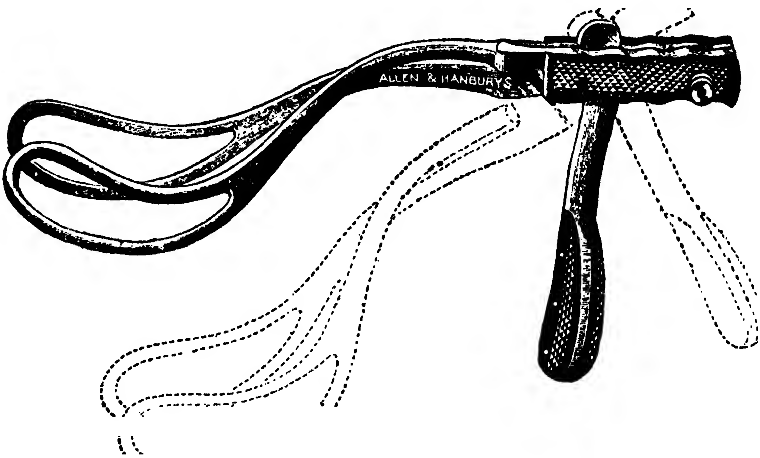


FIG. 757.
Le Page's Axis-Traction Forceps.
(Allen and Hanburys).

1896 (?). Champneys.

Dr. Francis Hy. Champneys graduated M.B. in 1875. He was lecturer on Midwifery etc., and Physician-Accoucheur St. Bart Hospital, London. He was elected President of the Obstetrical Society of London.

Champneys's Axis-traction forceps is mentioned in Krohne and Sesemann's catalogue. It is not illustrated.

1896 (?). Le Page.

An illustration of Le Page's axis-traction forceps appears in Allen and Hanbury's catalogue. (See fig. 757).

He also constructed an Axis-Tractor which can be used with any ordinary forceps. (See fig. 758).

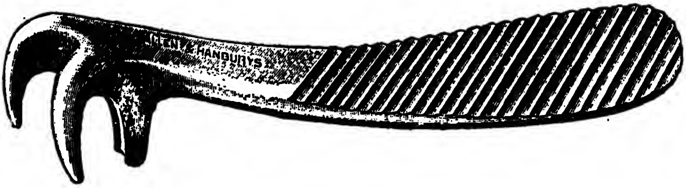
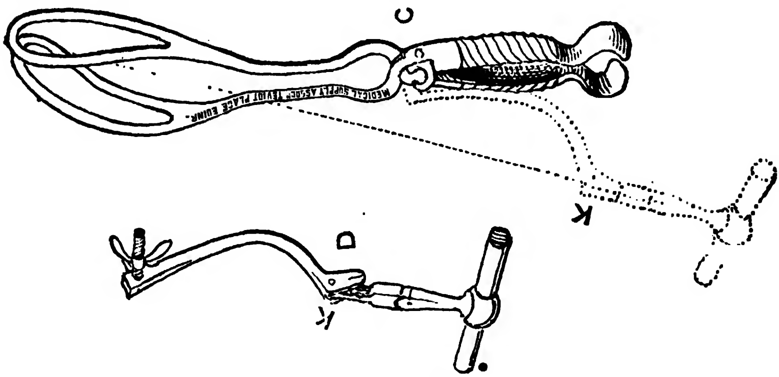


FIG. 758.
Le Page's Axis-Tractor.
(Allen and Hanburys).

1896 (?). Neville.

Neville constructed an Axis-Traction apparatus which was adjusted to Barnes' long forceps. This forceps has been largely used in the Rotunda Hospital, Dublin. The great advantage of this instrument is that the traction apparatus



FIGS. 759-60.
Neville's Axis-Traction Forceps.
(Jellett).

is entirely outside the vagina when the forceps is applied; that it is uncomplicated; that it is a true axis-tractor; and that the forceps can be used with or without the traction apparatus. (See figs. 759, 760, 761 and 762).

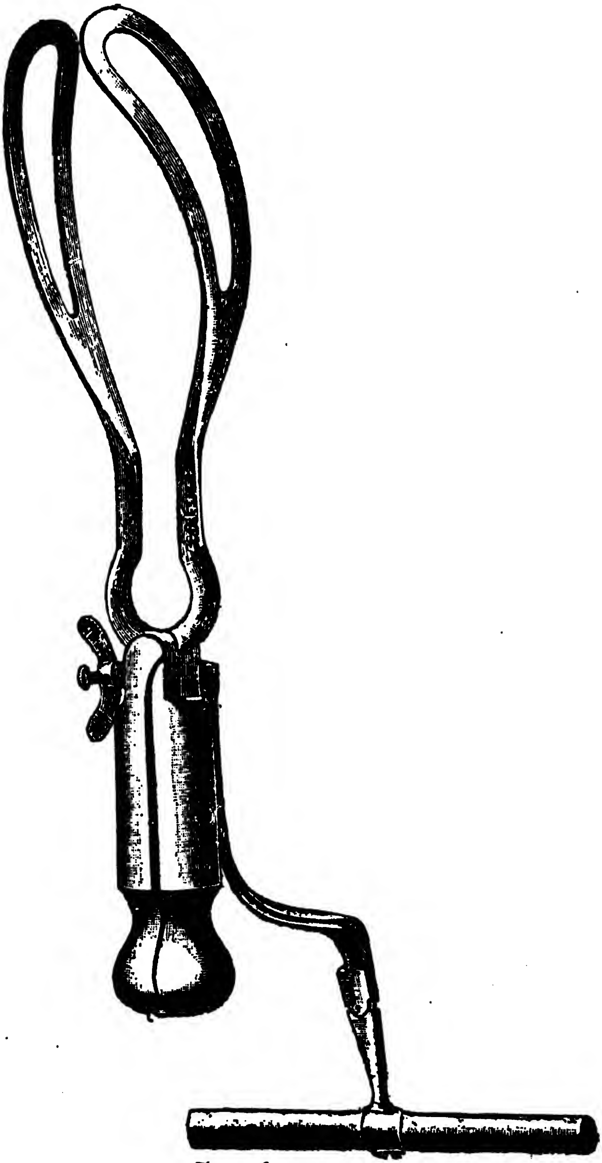


FIG. 761.
Neville's Axis-Traction Forceps.
(Jetter and Scheerer).

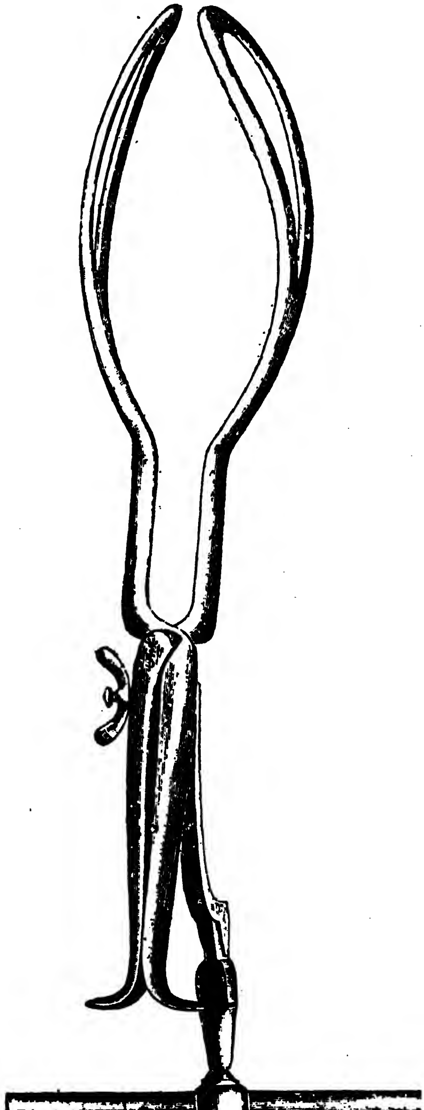


FIG. 762.
Neville's Axis-Traction Forceps
(Jetter and Scheerer).

1897. Fochier.

See fig. B on page 664.

1897 (?). Purchas.

Purchas's Axis-Traction forceps is mentioned in Gardner's catalogue. It is not illustrated.

1898. Benjamin.

Dr. D. Benjamin of Camden N. J. showed before the Philadelphia Obstetrical Society on June 2, 1898 a modified Simpson forceps and also a traction instrument.

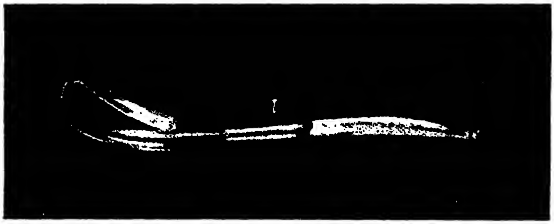


FIG. 763.
Benjamin's Forceps.
(Amer. Gyn. and Obs. Jour. XIII).

The instrument consists in Simpson's blades, with exactly the same cephalic and pelvic curve, with longer shanks, Simpson lock and Hodge handles. (See fig. 763).

The Axis-Traction rod devised by the author can be applied easily to any ordinary kind of forceps.

1898. Porter Mathew.

These forceps are made entirely of metal and can be sterilised by boiling. The traction-rods are detachable and easily cleaned. The weight had been diminished as much as is consistent with perfect rigidity, the diminution being most marked in the application handles, the latter thereby acting the more efficiently as true indicators of the change in the direction of the descending head.

The blades have a pelvic curve of a 7 in. radius. The cephalic curve too is more abrupt than usual. The blades are rigid and stout but narrower than usual. The lock is a close-fitting ordinary English lock. The application handles have been much shortened and lightened, and act as "indicators". The traction-rods are the well-known rectangular ones of Dr. Milne Murray. By an ingenious contrivance, copied from Dr. Cullingworth's forceps the rods are easily detachable by an aseptic joint, the old objectionable screws being done away with.

A new form of traction block has been designed by Messrs. Down Bros., which is mathematically and mechanically

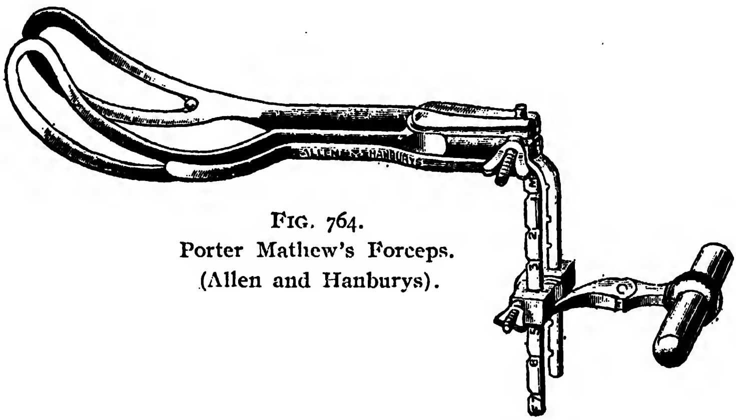


FIG. 764.
Porter Mathew's Forceps.
(Allen and Hanburys).

correct and have the advantage of simplicity, lightness, ease and rapidity of application. It admits of being easily cleansed and to ensure asepsis it can be boiled. One movement fixes the block and rods securely.

1898 (?). Palmer.

Two varieties of Palmer's forceps (long and short) are illustrated in Sharp and Smith's catalogue. (See fig. 765).

1898 (?). St. George's Hospital

St. George's Hospital pattern of forceps is illustrated in Montague's catalogue. (See fig. 766).

1898 (?). St. Bartholomew's Hospital.

An Axis-Traction forceps with removable internal tractors and take-apart fixing screw was made by Arnold and Sons for St. Bartholomew's Hospital. This is illustrated in their catalogue. (See fig. 767).

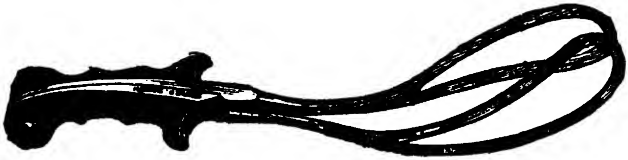


FIG. 765.
Palmer's Forceps.
(Sharp and Smith).

1899 (?). Davis.

This is practically a Simpson forceps with tape holes. (See fig. 768).

1899 (?). Scrogg.

Scrogg's forceps is illustrated in Traux Greene and Co's catalogue. (See fig. 769).

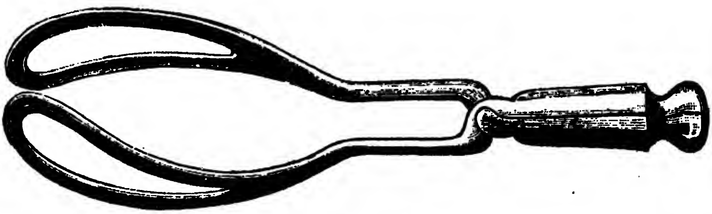


FIG. 766.
St. George's Hospital Forceps.
(Montague).

1899 (?). Holborn.

The Holborn surgical instrument makers modified Le Page's Axis-Tractor. (See fig. 770).

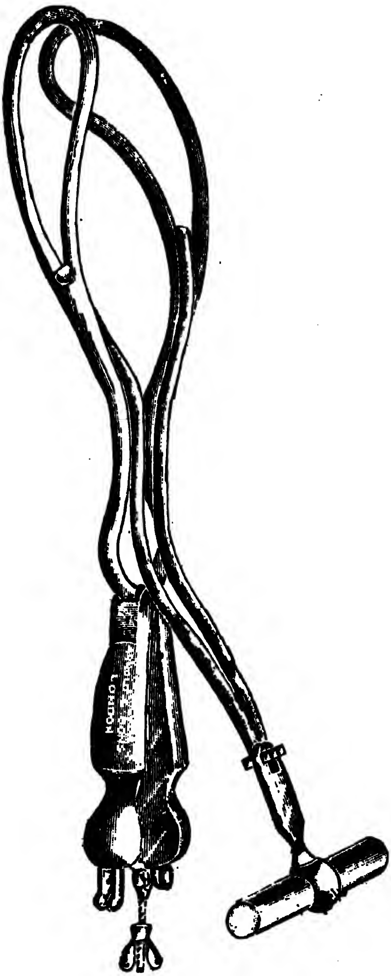


FIG. 767.
St. Bartholomew's Hospital Forceps.
(Arnold and Sons).

FIG. 768.
Davis-Simpson Forceps.
(Reid Bros.).

1899 (?). Hegar.

Two varieties of forceps, short and long, are mentioned in Jetter and Scheerer's catalogue. They are not illustrated.

1899. Berthold.

P. Berthold demonstrated a new model of forceps before the Obstetric Society of Paris on 16th November, 1899. This is

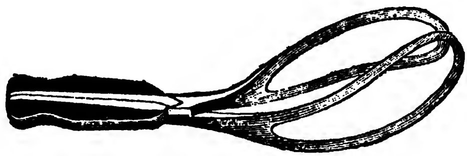


FIG. 769.
Scrogg's Forceps.
(Traux Greene and Co.).

a forceps with a firm lock and in the region of the lock is fitted a handle perpendicular to the branches, so that energetic traction may be made by one hand.

1899 (?). Hensoldt.

Hensoldt's forceps is illustrated in Jetter and Scheerer's catalogue. (See fig. 771).

FIG. 770.
Holborn Axis-Tractor.
(Holborn Surg. Co.).

1899. Demelin.

L. Demelin designed a forceps certainly unusual in appearance to those favoured by average obstetricians. His forceps consists essentially of blades with but little alteration from ordinary long curved forceps. About the centre of the sides of the fenestra of the blade is a hole. Through this a

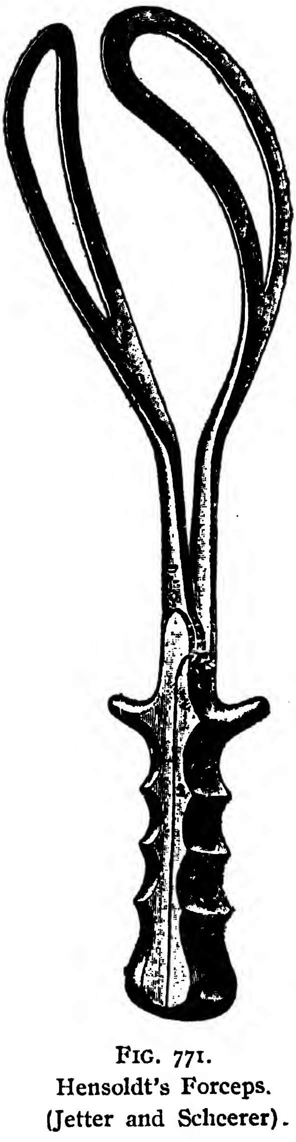


FIG. 771.
Hensoldt's Forceps.
(Jetter and Schcerer).

loop a cord can be passed. The shanks and handles are practically straight but there is no crossing of the two branches of the instrument. Each shank and handle lies on the same side as its blade when applied to the child's head and is kept adjusted there by means of two screws and nuts, one situated at each end of what corresponds to the handles. Correct traction is made by a loop of cord threaded through the corresponding holes, *i.e.*, the two anterior or two posterior holes in the sides of the fenestræ according to the requirements of the case. For occipito-posterior cases the pull is through the posterior sides of the fenestræ and *vice-versa* for occipito-anterior cases.

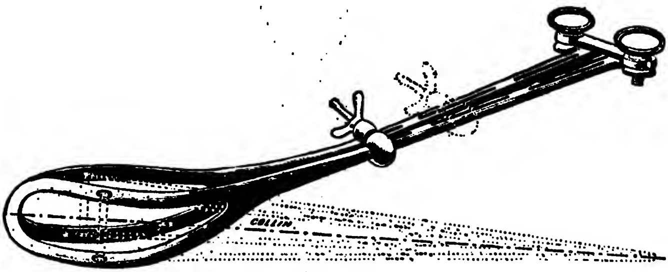


FIG. 772.
Demelin's Forceps.
(Collin).

Summing up his claims for his instrument Demelin says that (1) the grip is wide on account of the shape of the blades gripping the head closely and preventing slipping either off the head or sideways on the head. (2) The traction, made by a supple agent like cord, attached at the zone round the extremities of the bimastoid diameter, allows the head the maximum of mobility. As proofs he offers the results of experimental work with a mannikin in which it has been found that less force is expended with his forceps than with other patterns. Further, by connecting the experimental fœtal head with a manometer, it is found that the compression of it with his forceps is several times less than the ordinary Axis-Traction forceps of Tarnier.

1899. Ponder.

Dr. C. F. Ponder exhibited before the Edinburgh Obstetrical Society at its meeting held on January 11, 1899, a new forceps. He said:—I now show you a model of the instrument I have devised. Its object is to act as a dilator of the parturient canal for opening up the passages, thus removing the obstruction, so facilitating the descent of the head.

You will observe that it consists of three blades, the anterior ends of which open out to form segments of a cup shaped cavity which corresponds accurately with the normal fœtal head. The posterior blade is meant to push back the perineum, so straightening and dilating the maternal canal; the ridges on the outer surface of the blade are meant to ensure the increased wedge action of the forceps.

The anterior ends of the blades form segments of two ovals—(1) with an antero-posterior diameter of 3½ inches, corresponding to the upper portion of the pelvic canal; (2) the second, which when completed by the pelvic arch, corresponding to the pelvic outlet.

The posterior blade is about 1 inch longer than the other two so as to enable the instrument, by increasing the conjugate of the brim to a certain extent, to facilitate the entrance of the head into the pelvic cavity.

The different parts are so locked together that they can not possibly compress or exert traction on the head; so that screwing it up only tends to dilate the passage, and it forms, when screwed up, a rigid instrument, having the actions of dilating the maternal passages, protecting the head, and guiding it on its outward journey.

Such an instrument, if properly made, cannot possibly do harm to either mother or child. The practitioner will have no hesitation in applying it in normal labours. In this way we shall be able to achieve what I suppose all of us regard as the desideration of midwifery, *viz.*, a short second stage.

1900 (?). Dewey.

This new instrument in construction, is based on the Milne Murray principle. The handle and indicator take the place of the cumbersome rods in the Tarnier and Milne Murray original forceps. With the use of the Indicator on the Handle, the operator does not have to rely on his conscience musculaire for the direction of Traction and resistance. To get perfect traction just keep the point of the indicator directly opposite the line at centre of handle. This instrument makes Axis-Traction very simple. The handle is so arranged that it is easily removed and when necessary the forceps may be used without the traction handle. To remove handle loosen set-screw.

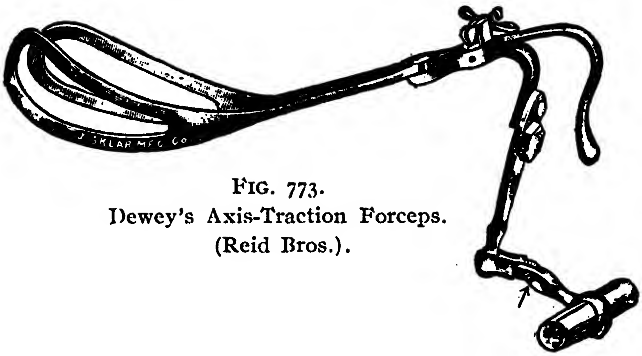


FIG. 773.
Dewey's Axis-Traction Forceps.
(Reid Bros.).

Measurements.—Total length—15 ins. ; distance from lock to end of blades 10 ins. ; length of blade 7 ins. ; distance between blades at tips $\frac{3}{4}$ in. ; distance between blades at centre $3\frac{1}{8}$ ins. ; pelvic rise, $3\frac{1}{2}$ ins.

1900 (?). Hart.

David Berry Hart was born October 12, 1851. He received his M.B. at the University of Edinburgh in 1877 and then studied in Vienna. On his return to Edinburgh, he became a private assistant of Prof. Alexander R. Simpson. In 1880 he received the degree of M.D. (Edin.). In 1884 he was made Assistant Physician to the Royal Maternity Hospital and in 1886 Assistant Gynæcologist to the Royal Infirmary, moving

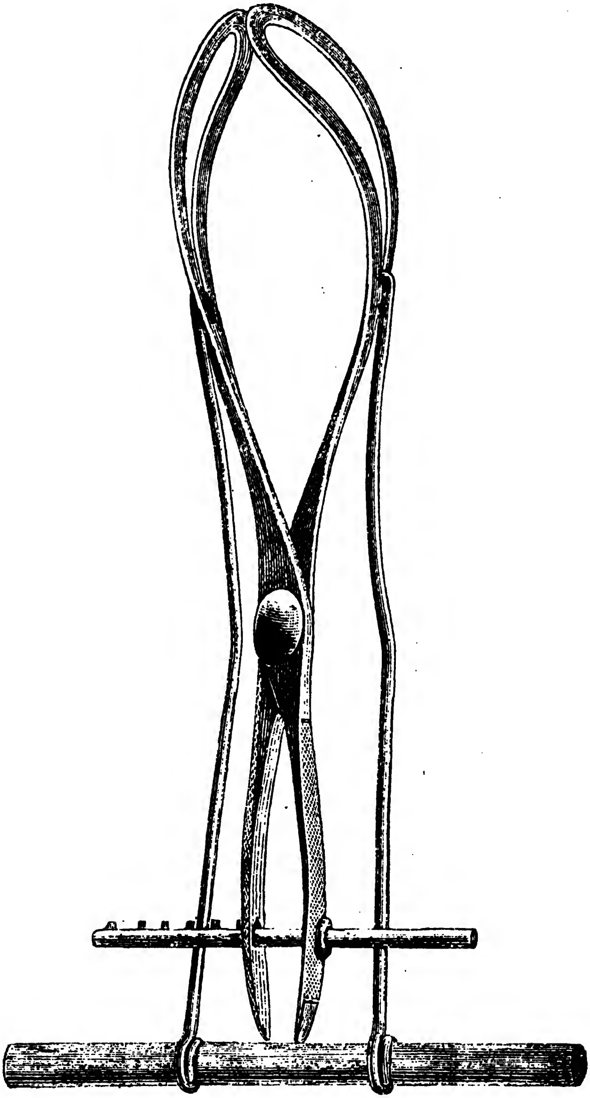


FIG. 774.
Schoellhammer's Forceps.
(Jetter and Scheerer).

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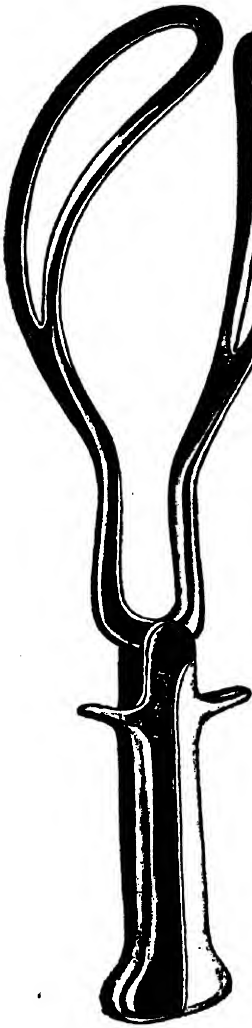


FIG. 775.
De Lee's Forceps.
(De Lee).

on to the senior appointments in 1889 and 1891 respectively. In 1883 he began systematic teaching in the School of Medicine of the Royal Colleges and continued to give courses on midwifery there until within a few weeks of his death. Here he collected a large and important museum. His contribution to medical literature were indeed valuable. Hart and Barbour's text-book on gynæcology was a pioneer work and undoubtedly helped, toward the establishment of gynæcology as "a true, self-contained, scientifically founded speciality." His "Guide to Midwifery" will even remain as a monument of the able and practical Obstetric teacher. He was the recepient of numerous honorary distinctions. He died on June 10, 1920.

Hart's forceps, with Axis-Traction by two rods, with hooked traction handles is mentioned in the catalogue of The Medical Supply Association. No detailed description or illustration is available.

1900 (?). Schoellhammer.

This forceps is illustrated in Jetter and Scheerer's catalogue. No description is available. (See fig. 774).

1900 (?). De Lee.

De Lee in his Principles and Practice of Obstetrics (1913) says "I have found that the best forceps for general use is the one of Simpson as adopted by the Vienna School often called the Vienna School forceps. I made the hooks larger and flatter so as not to hurt the hand and modified the handles a little to secure lightness and ease of cleansing but the essentials of the instrument are unchanged." (See fig. 775).

1900. Perret.

An Axis-Traction forceps with parallel blades, with the usual advantages of parallel forceps was shown at the meeting of the "Society d' Obstetrique de Paris" on 15th March, 1900. (See figs. 776-7).

1900 (?). Higgins.

Higgins designed Axis-Traction hooks which can be attached to any style of forceps. (See fig. 778).

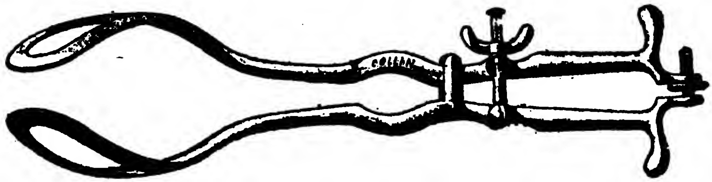


FIG. 776.
Perret's Forceps.
Front view.
(Collin).

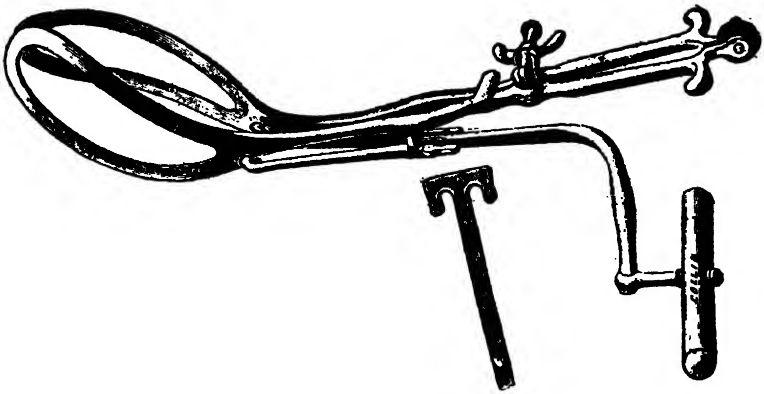


FIG. 777.
Perret's Forceps.
Side view.
(Collin).

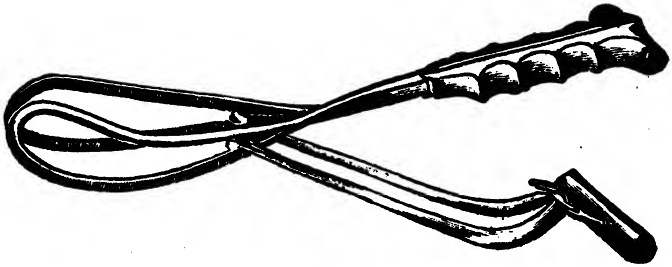


FIG. 778.
Higgins' Forceps.
(Reid Bros.).

1900 (?). Hirst.

Hirst's forceps is illustrated in Reid Brothers' catalogue. (See fig. 779).

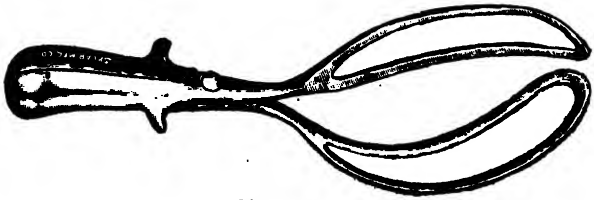


Fig. 779.
Hirst's Forceps.
(Reid Bros.).

1900 (?). Morrison.

An Axis-Traction forceps by Morrison is mentioned in S. Maw Son and Sons' catalogue. It is not illustrated.

1900 (?). Pippingshold.

The peculiarity of this forceps consists in the lock, which is of the English pattern, being placed high up. (See fig. 780).

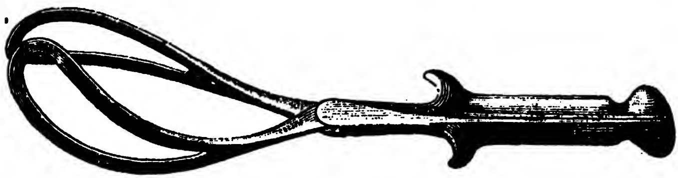


Fig. 780.
Pippingshold's Forceps.
(Collin).

1900 (?). Tibone.

This is an Axis-Traction forceps. (See fig. 781).

1900 (?). Werneck.

Werneck's modification consists in fenestration of the handles of a forceps of Barnes-Simpson type. (See fig. 782).

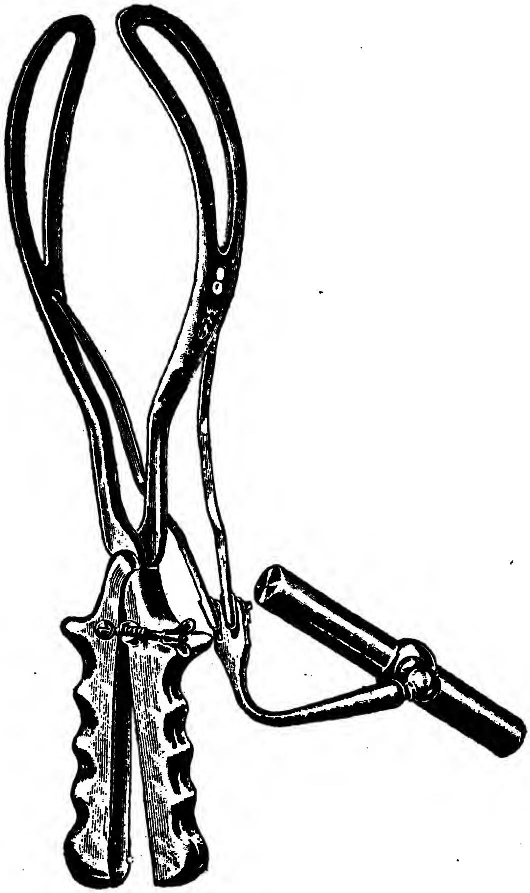


FIG. 781.
Tibone's Forceps.
(Kny Scheerer Corp.).

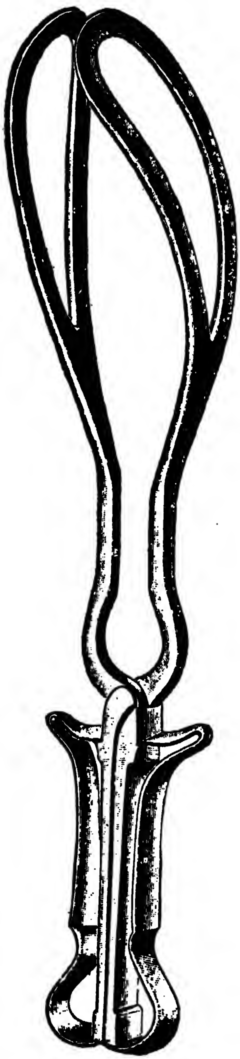


FIG. 782.
Werneck's Forceps.
(Kny Scheerer Corp.).

1900. Inman.

F. W. Inman of Wallasey constructed an improved Neville's Axis-Traction forceps, "the principal feature being an enlargement of the Axis-Traction rods, so that the traction is in the line of a tangent to a semicircle in the axis of the pelvis." In his opinion "the amount of bend in the traction-rod" of the ordinary Neville, is "insufficient."

FIG. A. Penoyee's Forceps. (1895).

FIG. B. Fochier's Forceps. (1897).

(Brindeau and Lantuejoul).

SECTION VIII.

TWENTIETH CENTURY.

1901. Stawell.

R. de S. Stawell of Shrewsbury, constructed a forceps with axis-traction adjustment which will be useful in general practice. He provided a pair of ordinary forceps of the Simpson-Barnes type "with an attachment which would readily convert them into an efficient axis-traction instrument, when required, while in no way interfering at other times with their use as plain forceps." The modification consists in having a short slot, with wide bevelled edges cut at the lower angle of the fenestræ in the blades, which are slightly widened at this point to prevent their being weakened. At the end of the handles is placed a lock. Two traction rods and a handle are supplied, to convert the forceps to an axis-traction instrument. The cranial ends of the rods engage with and lock in the blades, but are fitted on the inside of the blades; the studs are countersunk and finished flush with the outer surface of the forceps. The handle ends of the rods come directly together and are locked when the handle is attached, in the manner shown. The studs at this end are forged solid with the rods and are each made with a semicylindrical neck and a short transversely placed head so that when the studs are brought together, the two necks form a cylinder and the heads an oblong, cross-piece, which just passes through the slot in the locking-plate of the handle when held at right angles. On bringing the handle into the position of traction, the rods are securely locked, yet free movement is retained round the axis of the studs. Thus the additional joint in the ordinary locking-plate is dispensed with and the plate becomes lighter, simpler and stronger. (See fig. 783).

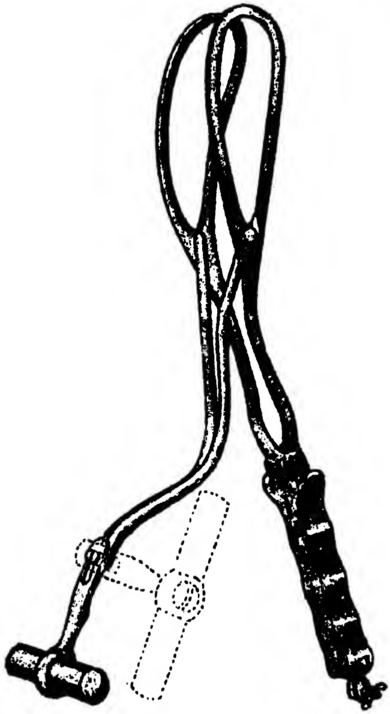


Fig. 783.
Stawell's Forceps.
(Brit. Med. Jour.).

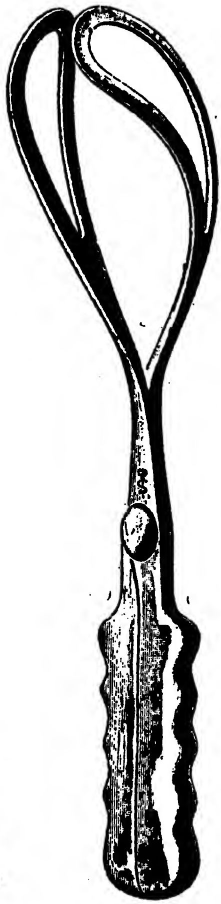


Fig. 784.
Opitz's Forceps.
(Jetter and Scheerer).

1901. Opitz.

Opitz demonstrated a new model of forceps before the obstetric and gynæcological society of Berlin on 25th January, 1901. The blades were smaller than those of Naegele. The cephalic curve was constructed to fit the head accurately. There were no traction hooks. (See fig. 784).

1901. Malatesta.

No description or diagram of this instrument is available.

1902. Bonney.

Victor Bonney constructed an improved pattern of axis-traction forceps. The blades were of the short broad type. The handles though light, afford an excellent grip. The shoulder of the Simpson forceps is dispensed with, as being unnecessary in an axis-traction forceps. The retaining screw is fixed close to the lock. The traction rods are rectangular and are so constructed as to allow of alteration in the position of the axis-

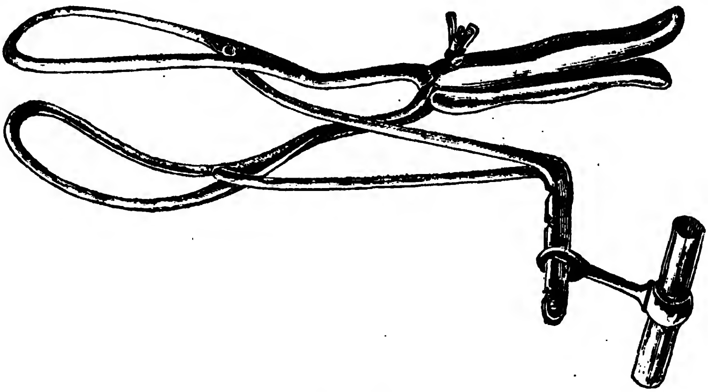


FIG. 785.
Bonney's Forceps.
(Brit. Med. Jour. 1902 ii).

traction handles, the mechanism adopted being a series of deep slots into which the axis-traction handle locks. The traction rods are slotted into the inner side of the forceps below the fenestræ. All parts of the instrument are readily detachable. (See fig. 785).

1902. Mocquot.

He showed a new model of forceps with parallel branches at a meeting of the Society d'obstetrique de Paris, held on 1st January, 1902.

1902. Vlaicos.

The modification of Tarnier's forceps by this, Turkish physician, consists of a scale on the compression screw that gives the distance between the blades so that in cases where the diagnosis of position is uncertain the diameter indicated on the scale shows whether the forceps has been applied transversely, obliquely or antero-posteriorly.

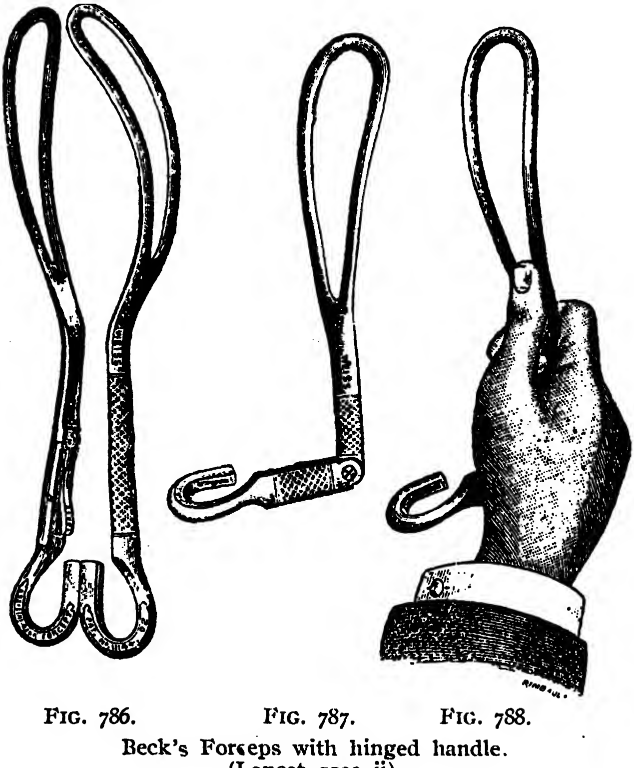


FIG. 786. FIG. 787. FIG. 788.
Beck's Forceps with hinged handle.
(Lancet 1902 ii).

1902. Beck.

Chas. Augustus Beck of Langsett designed an Assilini forceps with hinged handle. A hinged joint is introduced in the handle of the upper branch, which becomes firmly locked by a small lever. The object of having a hinged joint is to shorten

the blade whereby its introduction is greatly facilitated. (*Cf.* McMunn, 1886). (See figs. 786-8).

1903. Parodi.

Dr. C. Parodi of Brooklyn designed a combined obstetric forceps, perforator and cranioclast. (See figs. 789-90). The sharp pointed blade (fig. 789) represents the smaller (inner)

FIG. 789.

FIG. 790.

FIG. 789.—Parodi's Right blade of forceps with the perforator blade forming cranioclast. (Parodi).
FIG. 790 —Parodi's Forceps. (Perodi).

blade of the cranioclast and can be articulated by double lock (a button lock and a mortise lock) with the right blade of the forceps (fig. 789)' which (right blade) substitutes in this case the fenestrated blade of the cranioclast. The sharp-pointed blade is used separately as a perforator. The groove in the

inner surface of the pointed blade facilitates the evacuation of cranial contents.

1903. Friedman.

L. V. Friedman has devised an excellent modification of Tarnier's axis-traction forceps. This instrument is cleanly and the supplementary handle easily applied. The rods follow the curve of and lie flat on the under surface of the shanks. It is this inward curve which serves to portect the perineum. During application each rod is held fast to the shank by a small pin. At the lower end of each rod is an oval eyelet to

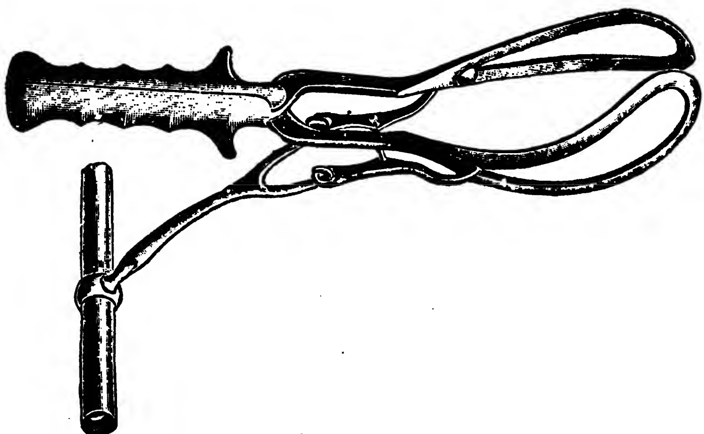


Fig. 791.
Friedman's Forceps.
(Reid Bros.).

receive the hooks of the handle. The bar is similar to those now in use but it holds by a lock-joint instead of a screw, the curved upright which bears the hooks. (See fig. 791).

1903. Freund.

R. Freund considers Tarnier's axis-traction forceps nearly perfect. There is only a slight mistake which "lies in an unequal distribution of the weight of the instrument. The handles are too heavy and therefore the blade already properly adapted

may be displaced. By removing the handles of the forceps—right behind the lock—and by constructing the single parts of the forceps thinner and from a light material, this mistake can be prevented." (See fig. 792).

1904. Greville.

Greville constructed a single rod traction forceps with "steel shell" handle.

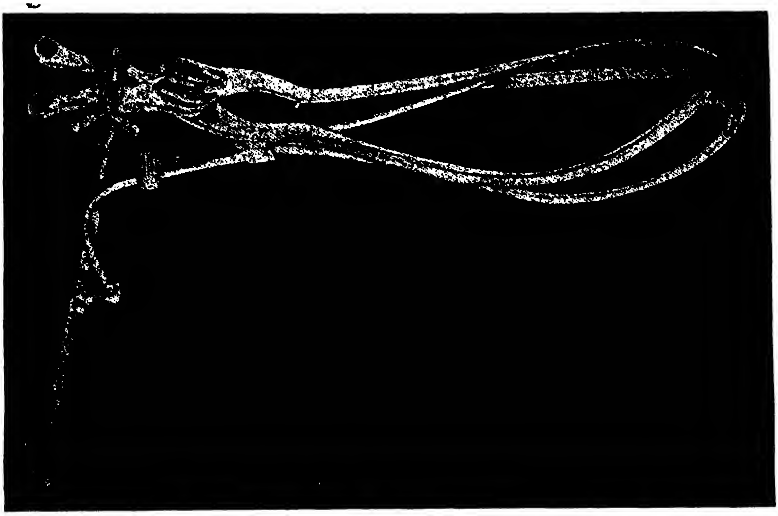
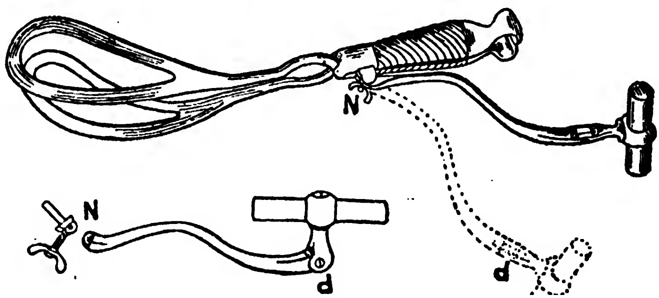


FIG. 792.
Freund's Forceps.
(Central. f. Gyn. 1903).

In his patent steel shell handles, forged solid, there is no closed cavity; the handle is one piece of steel with the blade, each side of the forceps is forged out of the solid. The external shape resembles the ordinary handles, but the steel is so spread externally that it is gripped by the palmar surface of the hand. In fact the handle is a steel shell. The inside of each handle is a polished boat-shaped concavity. It can therefore be easily cleaned. This hollowing renders the forceps actually lighter than ordinary forceps, although a single piece of steel. Being

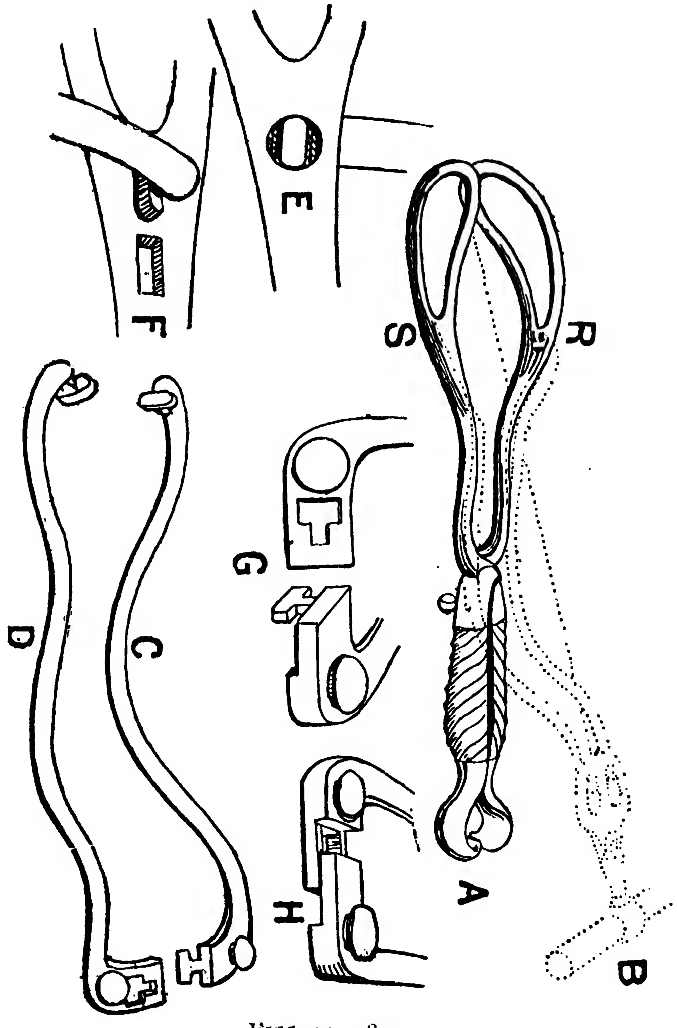
forged solid they secure perfect asepsis and are practically indestructible.

The advantage of the single rod over the double rod forceps is their greater *simplicity in application* because with them the forceps can *first* be applied to the head, then the traction rod can *afterwards* be easily attached to the forceps. In double rod forceps each blade has to be introduced *with the rod* attached, and occasionally there arises some difficulty in locking. In use they are practically identical in one respect. During rotation of the fœtal head, the instrument as a whole (whichever the type) rotates round an axis, represented in illustrations (figs. 793-5) as a dotted line showing the axis of traction. In another respect there is a great difference. In movements, such as flexion of



FIGS. 793—4.
Greville's Forceps.
Steel-shell handle and single-rod traction.
(Med. Sup. Assoc. Edin.).

the fœtal head, forceps of the double rod type swing freely on the ends of the two traction rods. Thus the forceps (illustrated in fig. 795 in heavy lines R. S. A.) would swing freely on the ends R. S. of the traction rods (shown in dotted lines). The axis of movement would be a line joining R. and S. Contrast this with the corresponding movement of Neville's forceps (p. 645). In this, the forceps drawn in heavy lines together with the *curved* part of the traction rod (dotted lines) form when in action, a rigid instrument swinging on an axis at the rivet K—*far outside the pelvis.* There is a great difference in the position of these axes. Which is mechanically the more correct?



FIGS. 795—802.
Greville's Forceps.
Steel-shell handle and double-rod traction.
A shows the forceps as ordinary forceps without traction rods.
B shows the traction rods (dotted lines) in position.
C and D show the traction rods removed.
E and F indicate how the rods can be readily attached to and removed from the forceps.
G and H represent how traction rods lock together.
(Med. Supply Assoc. Edin.).

Tarnier and the French School, the German School, Simpson, Milne Murray and the Scottish School have all adopted forceps swinging on an axis placed as in the double rod forceps. Experts hold that to be mechanically correct: we should attach the rods at points even higher up. But to do this we have to bridge across the fenestrum which would introduce a great disadvantage. In the situation of this axis, it must be admitted that the Neville's forceps is defective. Nevertheless the Irish School prefers it, holding that its greater simplicity in application more than outweighs the disadvantage named. We have recently introduced the forceps (see figs. 793-4) as an instrument combining all the advantages of Neville's, with its defect largely remedied as follows:—

1. In Greville's instrument the forceps swing *on the end* of the traction rod at the point *N* which is much nearer the correct place than in the Neville's forceps.

2. The indicator in Neville's has to be specially watched. In the Greville's forceps, the operator has to simply follow the handle as in Milne Murray's. In fact the handle itself serves as the indicator. This does away with the need of one joint and thus favours simplicity and asepsis.

3. In the Neville's forceps the movable part of the traction rod is only about 4 inches long. In use, however carefully one follows the indicator, it sways on either side of the correct line. With so short a radius slight movement means considerable departure from the correct line of the true axis.

In Greville's forceps, as in Milne Murray's the *whole* rod moves on the forceps. The rod being 8 inches long, is easier kept in the correct line than one of 4 inches, the more so as the handle of the forceps is much easier followed than the indicator of Neville's forceps. This is a great advantage. In other respects it is a Neville's forceps.

It is worth noting that, to prevent marking the fœtal head the edges of midwifery forceps should be well rounded; and to prevent the forceps from slipping the inner surfaces of the blades, which come in immediate contact with the fœtal head, should be flat rather than convex. Some prefer that this part of

the surface should be rather rougher or at least not so highly polished as is usual.

Briefly, the advantages claimed are:—

(1) It can be used without traction rod as an ordinary long forceps.

(2) It is light and easily cleaned thus ensuring perfect asepsis.

(3) It is less complicated having fewer parts and no unscrewing of rods.

(4) The traction rod is easily attached after the forceps is applied to the head.

(5) The forceps swings on the rod at the axis *N* which is mechanically more advantageous than if fixed at a point as in the ordinary Neville.

(6) Correct axis of traction is seen more easily than in Neville's forceps as operator has only to follow the handle as it moves from the rod. The handle itself is the indicator.

FIG. 803.
Hubert's Forceps.
Jointed Handles.
(Jetter and Scheerer).

1904. Hubert.

A new forceps with jointed handles by Prof. Hubert was demonstrated before "Gesellschaft fur Geburtshulfe und Gynakologie Zu Berlin" on 25th March, 1904. (See fig. 803). (See Schockaert).

1904. Petrides.

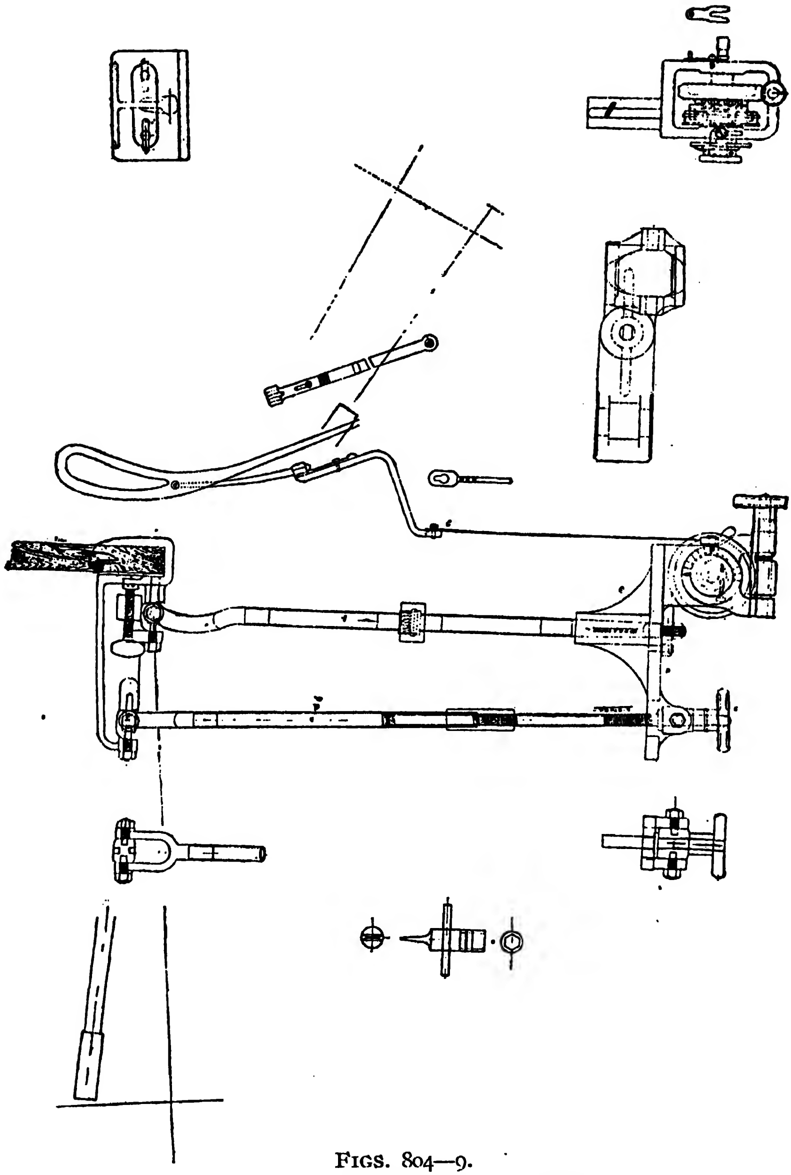
Petrides of Constantinople modified Breus's forceps by making a hinge between the horizontal and vertical part of the traction rods, in order to overcome the following disadvantages

of Breus's forceps:—(1) After the introduction of the left blade, it is very difficult to put in the right one, due to the vertical position of the traction rod. (2) It is very difficult to keep the traction rods in position during introduction of the forceps.

1905. Jacobson.

Dr. Arthur, C. Jacobson of Brooklyn, N.Y. "conceived the idea of a traction apparatus that would substitute mechanical exactness for human fallibility and yet not usurp the personal equation."

The instrument is designed to attach to the axis-traction forceps and to find its *point d'appui* at the edge of any table, to which it may be readily clamped. The apparatus consists of two rods, a steel tape, a cross-bar, a clamp and a dynamometer (with dial). There are also a spring, a worm, a gear and a drum which are not very well shown in the diagram (fig. 804). Traction is applied to the forceps by turning the hand-wheel in a right-handed direction. The hand-wheel communicates with the worm and gear, by which means the traction is obtained. The traction is transmitted to the drum by means of a spring which being calibrated registers the amount of traction upon the dial. *The power exerted by the operator is multiplied about fifty times.* The cross-bar is rigidly fastened to the upper rod which is fastened to the clamp by a universal joint (see fig. 810) and the cross-bar moves in the path of an arc. The universal joint allows of free lateral motion in case of deviation from the plane of the pelvic axis. The position of the cross-bar is determined in the vertical plane by the length of the lower bar which also is fastened to the clamp by a universal joint. The lower rod is a telescoped rod and is lengthened or shortened by turning a hand-wheel which is fastened to the cross-bar by a flexible joint so that either tension or compression may be exerted by the rod that is to say, in non-technical language, the entire apparatus may be raised or lowered as desired. When traction is exerted on the traction rods of the forceps, the tendency of the cross-bar will be to move upward. It can move upward,



FIGS. 804—9.
Jacobson's Axis-traction Apparatus.
(Amer Jour. Obs. LI.).

however, only as the lower bar is lengthened. This enables the operator to keep the traction rods parallel to the forceps at all times and also steadies the 'pull.' The rods can be removed from the clamp the cross-bar can be detached from all three bars and when detached the apparatus will occupy a very small space and will weigh less than eight pounds. The upper rod will also be divisible into two sections. The dynamometer is designed to register up to 120 pounds and can be read to one pound. Eight revolutions to the right of the hand-wheel will draw the forceps through a distance of one inch. This may be done as slowly or quickly as desired. Backward revolution of the handwheel that is to say to the left, takes off the traction. This may be accomplished as rapidly or slowly as desired. The steel tape slackens, while

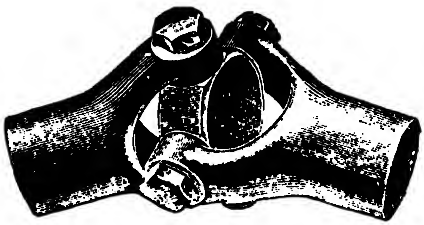


FIG. 810.
Universal joint of
Jacobson's Axis-traction Apparatus.
(Amer. Jour. of Obs. LI).

the apparatus is held in position by the lower rod until the dial begins to register.

The upper hand-wheel controls traction and the lower hand-wheel the line or direction of traction.

The multiplication of the power (about 50 times) applied to the upper hand-wheel will be secured by means of the worm and gear principle. Ordinarily, therefore *only a pound or a fraction of a pound* of power will be called for on the part of the operator. The bars are forked at the table end in order to straddle that part of the table clamp immediately beneath it. On account of the advantage of the lower universal joint, it will be necessary to fork the upper rod half its length, so

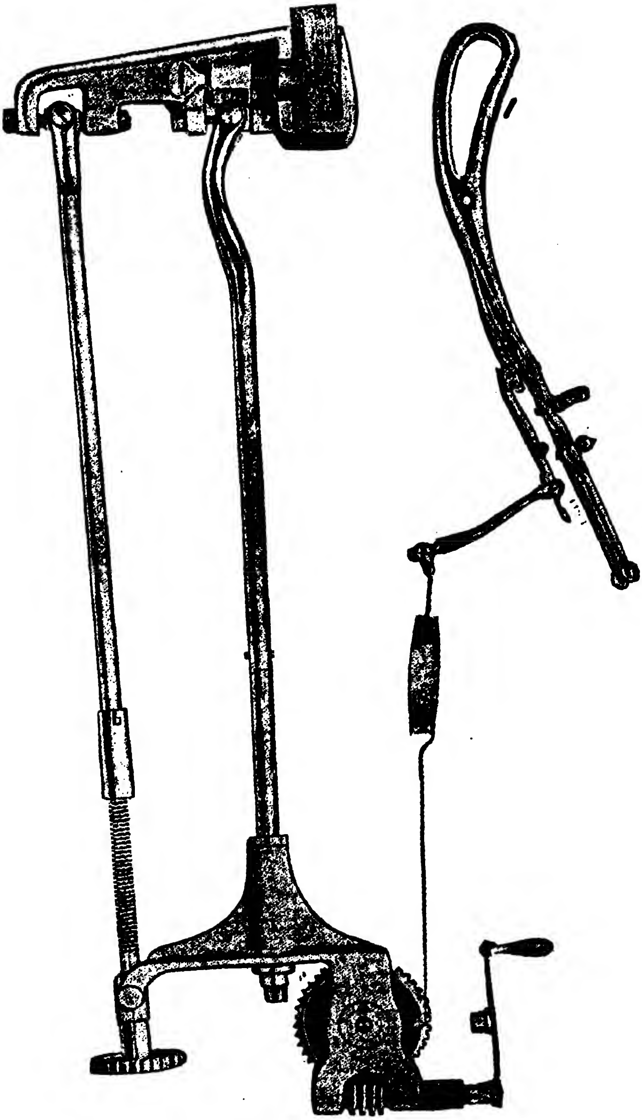


FIG. 811.
Jacobson's Axis-tractor. (Amer. Jour. of Obs. LIII).

that it will straddle the lowest part of the table clamp, as well as that part immediately beneath it and so that when not being used the entire apparatus may be swung out of the way beneath the table. The instrument will thus permit of circumduction or movement at any angle that will be desired.

The field of this instrument may be defined to be in that class of cases in which the axis-traction forceps is indicated, particularly in those cases in which difficulty in delivery is anticipated involving much physical exertion on the part of the operator. The method does not eliminate nor even tend to usurp the personal equation, which remains the paramount and controlling factor. It substitutes steadiness for unsteadiness, mathematical precision for in-exactness, measured traction for guess-work.

In a further communication in 1906, Jacobson recommends a somewhat complicated apparatus to assist the axis-traction forceps. The apparatus consists of a clamp which fastens the instrument to the bed or table, an outer case enclosing a worm and gear, two rods, a crank handle for operating the power producing mechanism, a hand-wheel and a steel tape attached to the cross-bar of the forceps. The amount of traction is measured by a dynamometer. (See fig. 811).

The author claims the following advantages for the apparatus :—

(1) Accurate measurement of traction. (2) Perfectly steady pull. (3) Maximum traction at any stage of delivery capable of being maintained uniformly for any reasonable time. (4) A minimum degree of traction suffices to accomplish delivery. (5) Physical exertion on the part of the operator is practically obviated. (6) The manipulation of the instrument is easy. (7) Slipping of the forceps is fraught with no danger.

1905 (?). Maxwell.

This axis-traction forceps is illustrated in Maw's supplementary catalogue. (See fig. 812).

1905 (?). Neil.

This is an axis-traction forceps with long bars. (See fig. 813).

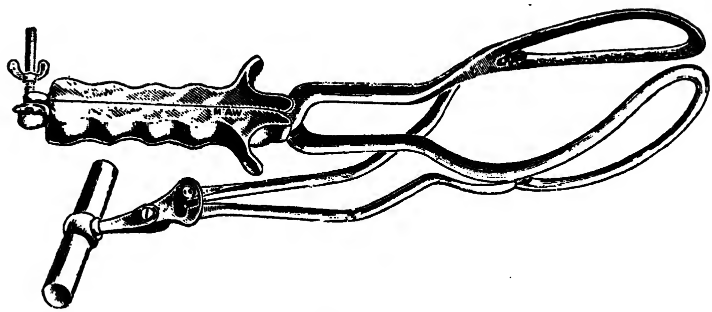


FIG. 812.
Maxwell's Forceps.
(S. Maw Son and Sons).

1906. Vlaicos.

Vlaicos of Constantinople demonstrated before the "Society d'obstetrique de Paris" at its meeting of 17th May, 1906, his

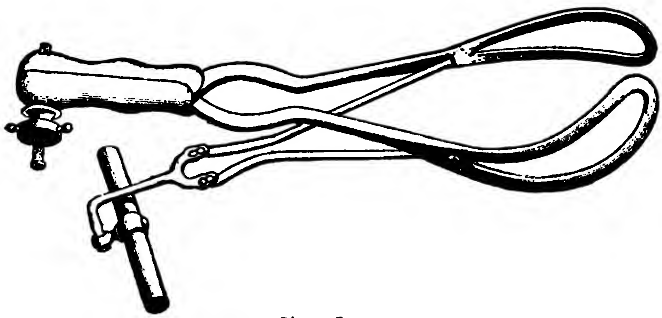
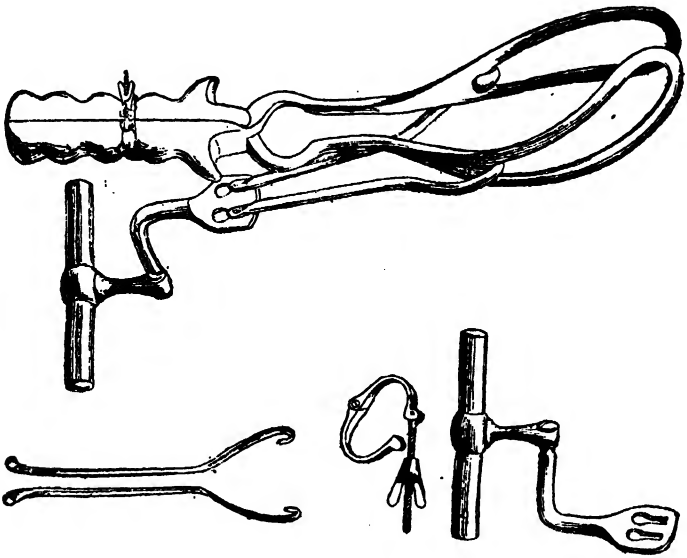


FIG. 813.
Neil's Forceps.
(Reid Bros.).

"Forceps Rotateur." There is a double articulation of the anterior blade, which is thus easier to introduce behind the symphysis pubis.

1906. James.

Fred. W. James designed an axis-traction attachment for ordinary obstetric forceps. This consists of "a removable clamp and outside traction rods with handle, the latter having a universal joint." It provides a method of using the ordinary forceps for axis-traction without the necessity of possessing a special instrument. (See figs. 814-7).



FIGS. 814—17.
James's Forceps.
(Lancet, 1906 i).

1906. Morgan.

H. B. Taylor Morgan devised a forceps "to avoid the necessity of introducing the left lower blade first." In these forceps, the blades do not cross, the lock is not at the junction of the handle and blade, but at the end of the handles and the lock can be fixed by a single turn of a stud. To prevent the blades from rolling one on the other a guide peg on the lower blade fits into a slot on the upper. A small swivel screw, attached at the junction of the blades and handles, prevents

the handles from flying apart; a traction rod can be used if necessary, as in the illustration." (See fig. 818).

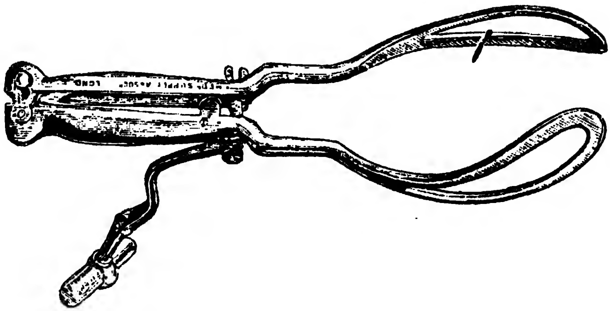


FIG. 818.
Morgan's Forceps.
(Lancet 1906, i).

1907. Audebert.

Prof. Audebert modified Hubert's parallel forceps.

1907. Boerma.

This instrument, devised by Boerma, (see figs. 819-20) consists of two practically symmetrical blades which differ but slightly at the lock. The blades proper are the same as in the Naegele forceps. From the point where the blades approach within 3 c.m. of each other, the handles instead of converging run parallel for a distance of 13 c.m. Figs. 821-4 illustrate the lock open and closed. When properly locked the blades can not move in opposite directions excepting in a rotary way by which the tips either diverge or approach each other. The whole instrument weighs but 350 gms. and is $27\frac{1}{2}$ c.m. long.

The forceps are short and very light and are intended for the descended head. The arms being parallel, the intersection which is often disagreeable and painful to the patient is entirely dispensed with and it is of no consequence which arm is first introduced. Traction with these parallel forceps does not cause pressure on the fœtal head, as is the case, more or less, with crossed forceps. The articulation is effected at the handle

end by a pivot at the left arm of the forceps which fits into a corresponding groove of the right arm.

The dynamic principles of the forceps with crossed handles are illustrated by Fig. 825 and the following equations: Letting S represent the lock and the short ends of the levers, the handles,

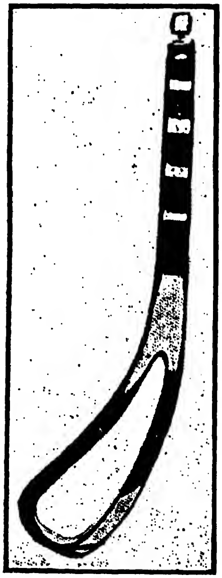
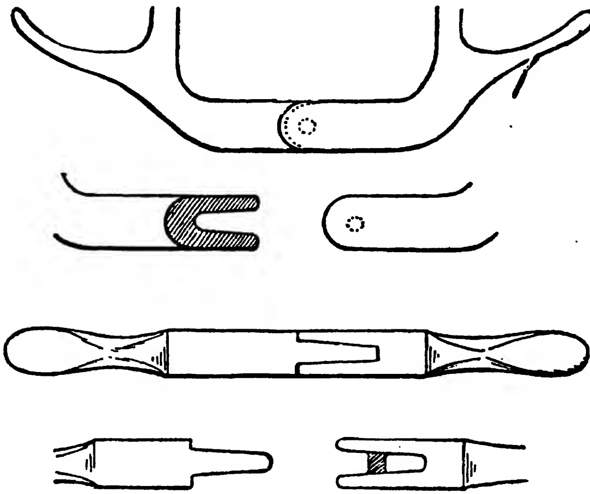


FIG. 819. FIG. 820.

FIG. 819.—Boerma's Forceps. Locked. Front view.
FIG. 820.—Boerma's Forceps. Side view.
(Berlin Klin. Wochschr. 1907).

he assumes that the pressure produced by the hands at *a* equals the resulting pressure G_a at *b* in the blades, hence $P \times aS = G \times bS$.

The same effect, $G \times bS$, is produced if a pressure R is exerted in a direction opposite that of P on a segment *c*S equal in length to *a*S. Hence $R \times cS = P \times aS = G \times bS$. Mechanically it is the same whether the pressure G is exerted at *b* or P at *a* or R at *c*. Therefore the lever *a*S is superfluous and consequently the handles of the ordinary forceps are superfluous,



FIGS. 821—4.
Lock of Boerma's Forceps.
(Berlin Klin. Wochschr. 1907).

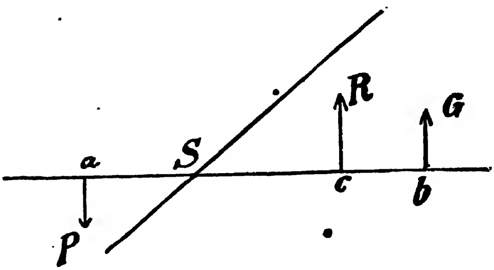
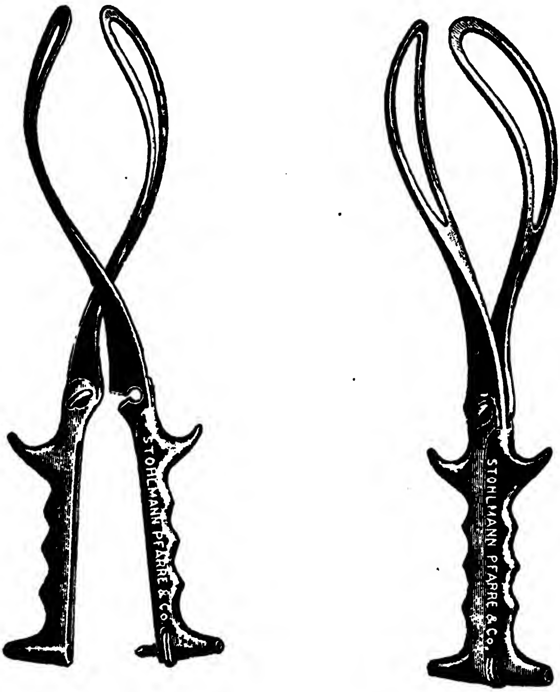


FIG. 825.
Boerma's enunciation of
Dynamic Principles of forceps with
crossed handles.
(Berlin Klin. Wochschr. 1907).

providing equal pressure may be secured on both arms of the lever between the head and the lock.

1907. Gallant.

A. E. Gallant contrived a safety lock which is a combination of French and English obstetric locks, for the prevention of



FIGS. 826—7.
Gallant's Safety Lock.
(Ref. Handbook Med. Sci.).

dangerous compression of the fœtal head by forceps. (See figs. 826-7).

1907. Good.

Frederick. L. Good of Boston Lying-in-Hospital remarks that the main difficulty with rods now in use is that in certain

varieties they are not permanently attached to the blades and that in others although attached, it often takes much time and assistance to secure their proper adjustment. The ideal forceps would be one with permanently attached rods which would come well down on the handles and could readily and with no loss of time, be utilized. Another objection to the present rods is their limited motion at the site of attachment—so limited that in some operative cases it is impossible to get the desired line of traction.

The forceps designed by him, does away with the above-mentioned difficulties. Fig. 828 shows the traction rods already applied to the forceps in grooves having the same axis as the handles, the left rod running down from the fenestrum, following practically the same line of direction as the blade itself and

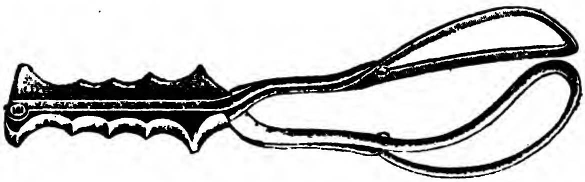


FIG. 828.
Good's Forceps.
(Surg. Gyn. Obs. V.).

attached at the end of the handle and posterior by a spring-lock. The right rod is attached at the fenestrum and is then carried in front of the shank and follows the same general line of direction as the right blade differing from the left only in its position, it being anterior instead of posterior. The spring-lock at the end of either handle for retaining the rods in position will be eliminated in other forceps; not because it is a bad feature but it is not an essential one and the rods can be as well fastened by means of a pin lightly catching the handles. In order to bring the right rod down into the right handle it became necessary to cross over the lock, consequently decreasing the "depth of the lock to a slight degree.

Fig. 829 shows the rods free from their attachment to the handles and attached to the traction handle, the blades being

locked by a *T*-shaped clamp passed through the handles and regulated by a thumb-screw at the opposite side. This apposition clamp will in no way interfere with making changes from one method of operative delivery to the other.

After having applied and locked the forceps one uses very little pressure on the thumb-piece of the left rod, thereby freeing it from its attachment and allowing it to drop back to be attached to the axis-traction handle. The right traction rod is then lifted from its attachment by means of its thumb-piece, is carried over the left handle and dropped back as was the left. The rods are attached at the fenestra in such a manner that one can rotate them completely and when attached to the

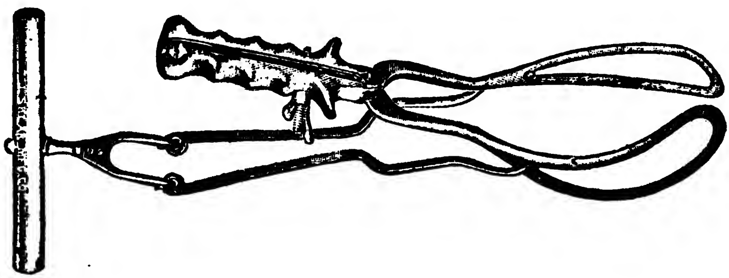


FIG. 829.
Good's Forceps.
(Reid Bros.).

handle allow of traction to an angle of 90 degrees; they are so made to fit the fenestra that it is impossible for them to fall out, but they can be easily removed by the operator.

The traction handle consists of a modified *Y*-shaped apparatus attached to the middle of a transverse bar, hook-shaped at either arm of the *Y* and with a spring so attached that the rods can not slip from the handle. The arms of the *Y* work on a swivel, thus assuring an equal pull on either rod.

The advantages claimed for the instrument are (1) easy manipulations (2) less liability to do injury during delivery, (3) less time required to apply and utilize traction.

1908. Arnoux.

Arnoux demonstrated a forceps with movable perineal and pelvic curve, at a meeting of the Society d'obstetrique de gynecologie et de paediatrie de Paris held on 19th Nov. 1908.

1908. Stockman.

This forceps is a modification of Hubert's forceps and may be used both as crossed and parallel forceps.

1908. Massimi.

Massimi, of Rome, describes in detail a forceps designed to compress the head as little as possible during traction. In general shape the forceps resembles that of Aveling's, with the handles bent back in a perineal curve. At the tip of the handles there is a screw by which the approximation of the blades can be regulated from 2 to 5 c.m. at their tip and 6 to 9 c.m. in their grip. Traction rods are avoided as being too complicated and difficult to sterilise.

1908. Macan.

Sir A. Macan modified Neville's forceps on which he had a stop put, so that by making a slight movement of the axis-traction handle he could tell at once, without looking that the pointer was in the right direction.

1909. Latzko.

Latzko demonstrated before "Versammlung Deutcher Naturforscher und Artze in Salzburg" 19th and 25th September, 1909 a forceps constructed by him for use in cases of extra-peritoneal cervical Caesarean section with the blades crossed in a manner opposite to the usual, thus avoiding difficulties during extraction.

1910. Penrose Williams.

Mr. L. W. Penrose Williams of Bridgwater constructed an axis-tractor, which is a modification of Le Page's tractor, which in Williams' opinion is too small either for grasp or for power. As a rotator, this is a new instrument. "In this instrument the claws are longer and not only hold the tractor in position but lock the blades together, an important point, as the combined apparatus can be steadied or traction made with the left hand alone, the right being free for examination etc., and the increased length and weight of the handle increase its power, of course, to a considerable degree."

"The application of this tractor is simple, being always free of the maternal soft parts. The forceps and tractor form

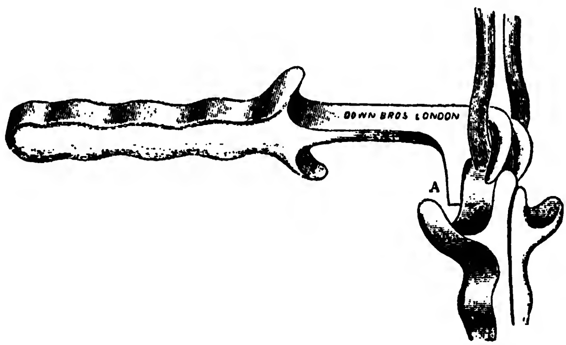


FIG. 830.
Penrose Williams' Axis-tractor.
(Down Bros.).

one rigid apparatus and become a lever. Either the point *A* or the handle of the forceps may be made the fulcrum at will. On the principle of the parallelogram of forces, a force in the same direction can be applied by either hand alternately or both together, the direction and plane of the resultant being determined by the proportionate amount of force used by either hand and thus affording most welcome relief of the operator's musceles. For converting occipito-posterior presentations, the forceps should be applied and the tractor placed in position; the head can then be "lifted" in the pelvis and rotated with

the greatest ease, the forceps, of course, being then removed and re-applied if desired." (See fig. 830).

1910 (?). Leipmann.

Leipmann introduced a substitute for axis-traction which is applicable to any ordinary forceps. (See fig. 831). The illustration shows how correct axis-traction may be made by Liepmann's simple and inexpensive substitute as compared with the employment of the complicated and expensive axis-traction forceps.

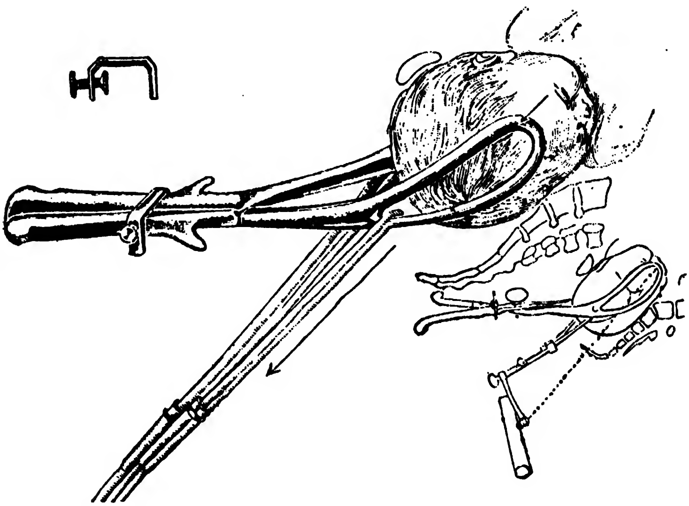


FIG. 831.
Leipmann's Method of Axis-traction
applicable to ordinary forceps.
(Med. Waarenhaus, Berlin).

1910 (?). Leonard.

Leonard's forceps is illustrated in Reid Bros' Catalogue. (See fig. 832).

1910 (?). McClintock.

McClintock devised an axis-traction bar which could be used with an ordinary forceps. (See fig. 833).

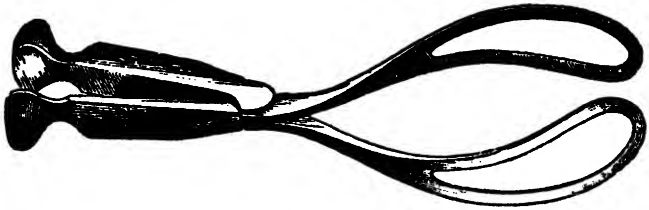


FIG. 832.
Leonard's Forceps.
(Reid Bros.).

1910 (?). Schwartz.

An illustration of this forceps appears in Reid Bros' Catalogue. (See fig. 834).

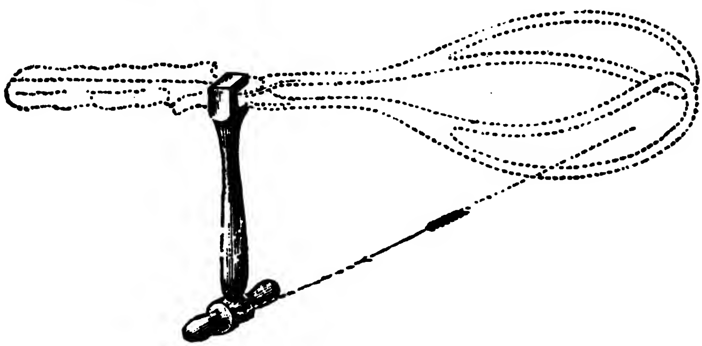


FIG. 833.
McClintock's Axis-traction Bar.
(Reid Bros.).

1910. Kosmak.

George W., Kosmak of the Lying-in-Hospital, New York modified the forceps for use in "that class of cases where the fœtal head is caught at the outlet, where the patients pain have simply given out and no further progress of the advancing head is possible."

"The Tucker-McLane instrument has been used as the basis of the writer's idea. With the exception of being slightly narrower, the size and contour of these blades are the same as in the large forceps, but instead of the usual shank the blades are inserted directly into the handles. The pelvic curve is also slightly less than in the ordinary instrument." (See figs. 835-6).

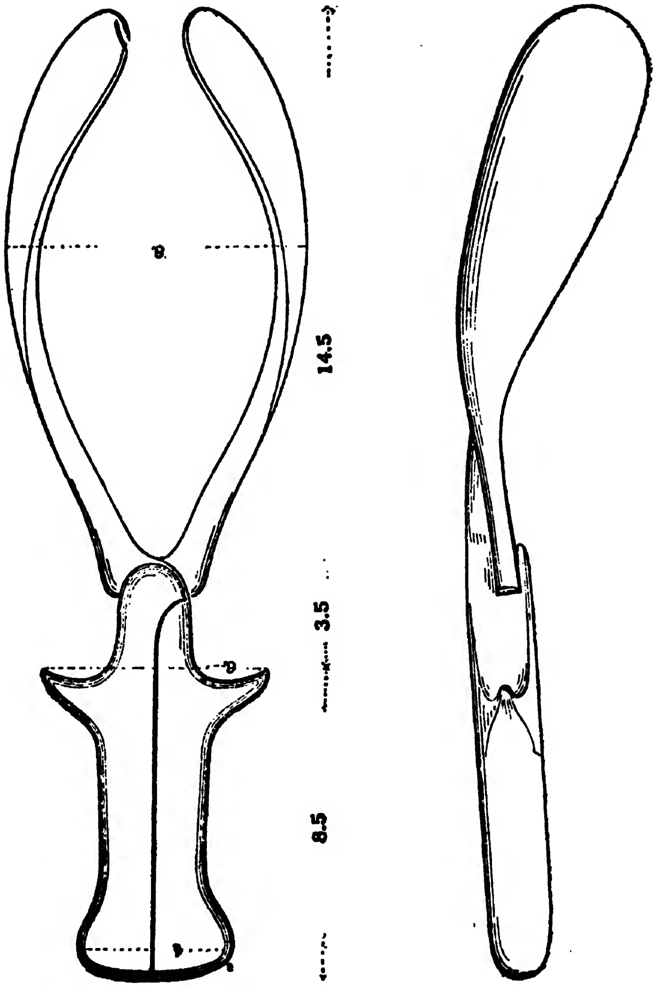
The measurements are shown on the illustration.

1910. McDonald.

Ellice McDonald of New York has modified the Tucker-McLane solid blade forceps in the following ways. He has shortened the blades, widened the tips and caused a number of transverse fenestra to be cut in the blade. The handles remain

FIG. 834.
Schwartz's Forceps
(Reid Bros.).

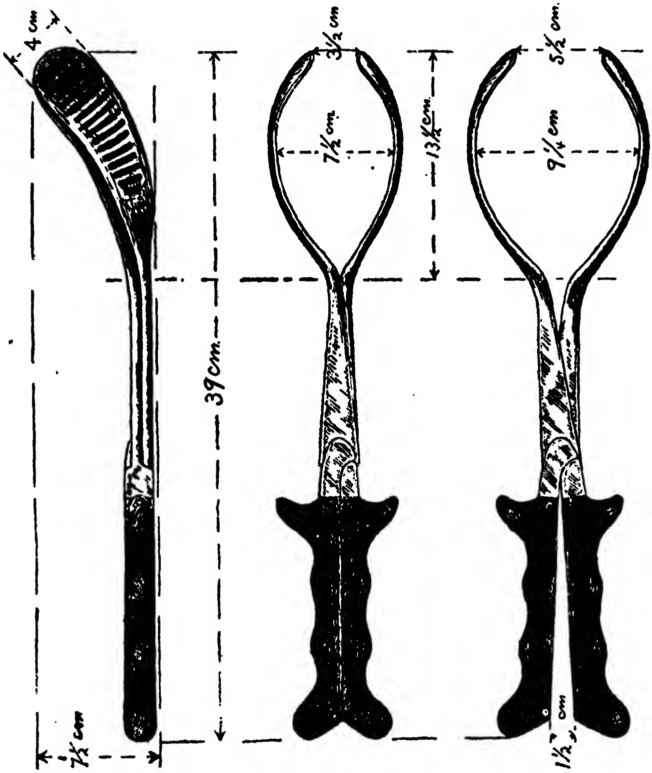
the same. These modifications caused the forceps to approximate more closely to the fœtal head to grip more firmly the parietal eminences, which are the firmest part of the fœtal shank and they are not prone to slip off. The measurements of the forceps are, when the forceps are closed, 3.5 cm. between the tips. The bowl is 13.5 cm. in length. A very interesting proof of the correctness of this degree of division of the tips is that when the forceps are divided, as may be seen from the illustration, to the size of the average biparietal diameter 9.25 cm. over which they would be naturally applied, the points of the forceps are separated 5.5 cm. Both the Elliott forceps and the Tarnier forceps, give the same measurement,



FIGS. 835—6.
Kosmak's Forceps.
(Bull. Lying-in Hosp. N. Y.)

and it may be assumed that with an average-sized head the forceps tips should be separated 5.5 cm. (See figs. 837-9).

The multiple fenestra do not detract from the strength of the forceps nor from the ease of application and add considerably to the gripping power to prevent slipping off the head. In these



FIGS. 837—9.
McDonald's Forceps.
(Amer. Jour. of Obs. LXI).

semi-fenestrated forceps, the blades may be narrower and the pressure on the fœtal head better distributed.

These forceps have the advantage of ease of application because of the shortness and narrowness of the blades.

They have been in use since 1905.

The following details of the sample of this forceps in the museum of the R.C.S. of England are reproduced from Doran's catalogue 1921, p. 51.

"Weight 11.9 oz. (610 grams). length 15¼ in. (36.7 cm.): blades and shanks 9 in. (22.8 cm.), the shanks taking up 4 in. (10.16 cm.) other measurements are given below.

Each part of this instrument is made of one piece of steel nickel-plated, except over the handles which are left rough. The handles are widened out at their free ends to form a palm-rest, they bear deep finger depressions on their sides and each has a distinct finger-rest above. They are hollow inside for lightness. The shanks are very long, flattened anteriorly and tapering towards the blades, the upper is completely superimposed on the lower or left shank when the blades are closed. English lock, handles extended upwards beyond the finger-rests to meet it, as in Busch's forceps.

The most peculiar feature of this instrument is the form of the blades. Dr. Ellice McDonald designed this forceps for reasons which he gives at length in "The forceps operation," Amer. Jour. Obstetrics vol. lxi, 1910, p. 224. He considered that in Simpson's forceps the blades were too long, endangering the soft parts when traction are made on the head. Although most obstetricians consider that long shanks involve more risks than long blades, Dr. McDonald finds that the reverse is the case and that the space between the shanks in Simpson's forceps often causes stretching and tearing of the fourchette before the head reaches the perineum. In order that the blades may be easy of application, they are made relatively narrow, and the cephalic curve is less pronounced than in most modern forceps. The solid blades (as in the Tucker-McLane forceps, another recent type) allow of a safe grasp, and Dr. McDonald has made them as short as possible and wide at the tips. They bear numerous transverse fenestrae (8 in this sample, 15 in the drawing in the author's paper). These modifications allow the forceps to approximate more closely to the foetal head and to grip more firmly the parietal eminences. The bowl is 5⅜ in. (13.5 cm.) in length, the blades are 1½ in (3.8 cm.) broad near the tips, narrowing considerably below and bearing a distinct

pelvic curve and when they are closed their extremities lie $1\frac{3}{4}$ in. (3.5 cm.) apart. The greatest breadth across the blades is a little over 3 inches (or about 7.75 cm.).

1910. Tristan.

Mr. Richard Tristan modified Assilini's forceps by altering the handle. He claimed that they were easily applied and he had himself used them for 23 years.

1911. Haig Ferguson.

Dr. Haig Ferguson showed before the Obstetrical Society of Edinburgh on Dec. 13, 1911, an obstetric forceps modified to allow of axis-traction by tape attachment *i.e.*, by the application of Poullet's tapes to the ordinary Simpson Forceps.

For most forceps cases this instrument may be used *without the tapes* and traction applied just above the lock by adjustable handle. The application handles have been shortened by two inches and the usual fixation screw has been retained. With the adjustable handle axis-traction can be secured without the tapes when the head is *well into* the cavity and *at the outlet* ; and there is no dangerous compression of the head by the forceps during the tractions nor any interference with the mechanism of its passage through the pelvis. The adjustable handle can be used if desired to attach the tapes to, in tape-traction. A dynamometer can also, if desired, be attached to the tapes so as to measure the strength of the traction—which should never exceed 50 lbs as a maximum.

1911. Knapp.

Dr. C. B. Knapp showed before the society of the alumni of the Sloane Maternity Hospital a pair of axis-traction forceps, modified by him. The handles were modified (see fig. 840) so that traction could be continued after the head had been brought into the pelvis. Moreover in the ordinary model there is frequently difficulty in attaching the axis-traction handle, as the point of attachment, may be some distance within the vulva, especially where the head is high. In order to overcome this,

the shank on the present instrument was lengthened half an inch so that in attaching the axis-traction handle, the manipulations could be carried on entirely outside of the vulva.

1912. Farrior.

James W. Farrior of Philadelphia, a fourth year Medical student of University of Pennsylvania, designd the following new axis-traction handle.

"The most popular types of axis-traction forceps, as represented by the Tarnier, Milne-Murray, Simpson, Breus and

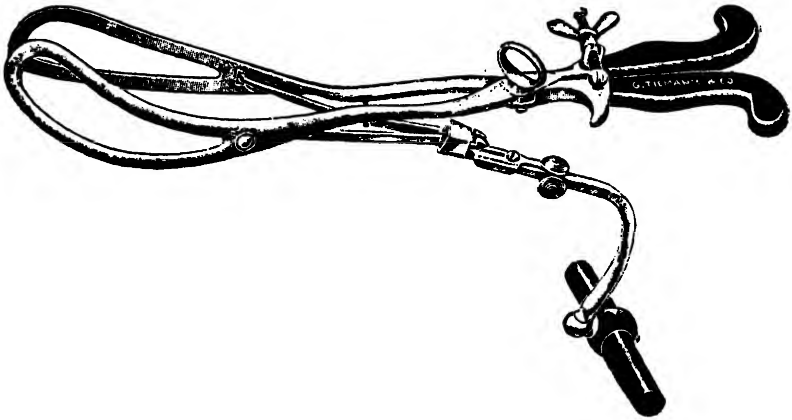


Fig. 840.
Knapp's Forceps.
(Amer. Jour. of Obs. LXIII).

a few others owe their effectiveness to steel rods which are fastened by a hinge-joint to the blades of a pair of long forceps. The Poullet differs from these in that the rods are replaced by tape which can not be as strong and is equally liable to cause laceration of the perineum. The Sanger forceps has leather thongs which pass from an attachment to the blades, through a rubber ring around the handle, to the hand of the operator. The Dewees, which has recently come out, has neither rods nor tape, but is not adapted to anything except axis-traction work, and is therefore not adapted to the later stages of a forceps delivery.

My axis-traction handle can be attached to any forceps, converting them into as perfect axis-traction forceps as any on the market; provided, of course, they have a sufficient pelvic curve and are long enough. There are no hinges within the birth canal nor are there any extra parts as rods or tape. The new instrument is small and occupies less space in the obstetrical bag than any axis-traction forceps. It is easily and quickly applied or removed. (See fig. 841).

The handle shown in the illustration was made by Charles Lentz & Sons, Philadelphia. Since an axis-traction forceps is not intended for work within the birth-canal and a forceps of the ordinary pattern is in every obstetrician's bag anyway, this attachment replaces an expensive special forceps, at a small cost.

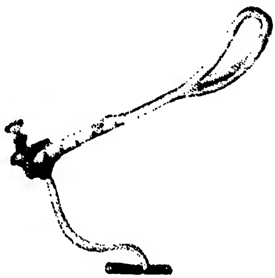


FIG. 841.
Farrior's Axis-traction Handle.
(Surg. Gyn. Obs. XIV).

In almost any of the axis-traction forceps, breaking of the instrument might result in a laceration of greater or less severity and the rods or tape, present in all except the Dewees, often injure the perineum in spite of care to prevent it.

When using the axis-traction handle with a forceps for the first time, the handle should be fastened at such a point on the forceps that the arrow near the grip of the traction handle, which is not visible in the cut, will point approximately at the centre of the child's head when the forceps are being used. This point may be marked or merely noted, as the exact angle in any individual case can not be known. The traction handle is to be fastened on after the forceps have been applied and

should be at the point as determined above. The top thumb screw is unscrewed so that the forceps handles may be placed between the knurled surfaces and, having closed the forceps so as to grip the child's head, is then screwed down firmly. This locks the forceps on the child's head and fastens the traction handle rigidly to the forceps. Next loosen the lower screw and the handle can be rotated approximately about the axis of the forceps so as to allow for the oblique positions of the head. As soon as the head has been drawn through the superior strait and the axis-traction instrument becomes useless or worse than useless, the top screw can be loosened and the traction handle removed. The removal is not necessary, however, for the rigid attachment would prevent annoyance and possible injury from a swinging part.

It is easily seen that the pull is in the right direction. Fastened firmly to the forceps, the traction handle becomes one with them so far as the transmission of force is concerned. In the ideal case, only two forces would exist in the delivery: first the resistance of the superior strait to the entering head, which would be in the direction of the birth canal at this point is at an angle of 55 degrees to the axis of the trunk, the line of force must be in this direction if there is to be no impinging of the head on the bony rim of the superior strait. Having applied the forceps and attached the traction handle, if the line from the grip of the latter to the head of the child corresponds to the 55 degree line, then force applied along this line, will be opposed only by the resistance of the superior strait to the entrance of the head. In a delivery it is essential that no tissue should intercept the line of force transmission. The soft parts and the sacrum lie in this line, but the curve of the handle avoids them.

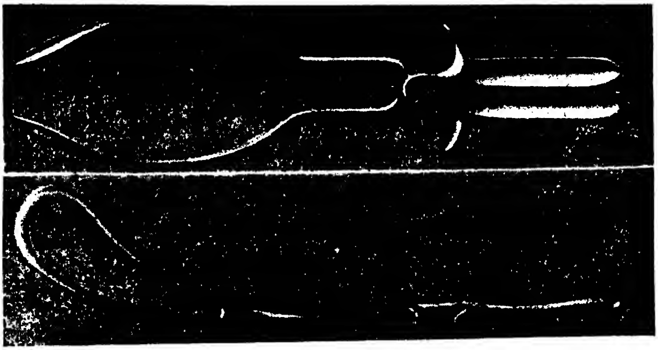
A proper entrance of the head would result in a minimum of injury to both the mother and the child and would make the operation as easy as possible.

1912. Das.

Kedarnath Das of Calcutta modified the ordinary Simpson type of forceps so as to adapt it for use in Bengali women. He

found that the average measurements of the pelvis in Bengali women are about $\frac{7}{8}$ths of those in British women. The average weight of a Bengali full-term baby is about $\frac{6}{7}$ ths of that of a British baby, while the size of the head of the former is proportionately smaller. The use of forceps manufactured on British standards upon Bengali women frequently caused injuries to the mother.

Two types have been devised—the ordinary and the axis-traction.



FIGS. 842—3.
Das's Forceps.
(Das).

The ordinary type of modified forceps—the "Bengal forceps" as it may be aptly called is lighter and more delicate than the ordinary models in general use. While the weight of a pair of Anderson's forceps is about 1 lb. 10 ozs. the "Bengal forceps" weighs only a pound. In the "Bengal forceps" pelvic curves are a little more pronounced than usual and the distance between the shanks near the joint is wide enough to admit the forefinger. The handles are made like those of amputation knives, and give an efficient hold without adding much to the weight of the instrument. Moreover, being flat they allow the thumbs to rest as a fulcrum very effectively during the final stage of extraction of the head. The shoulders, which have

been made as small as possible, merge gently into the handles so as to allow the operator's fingers to rest comfortably.

In the axis-traction model, the blades are fitted with detachable axis-traction rods which are supplied with Down Bros.' registered catch. The traction handle (hollow) is about 3 inches long and is made as light as possible. At the lower end of the handle of the left blade there is an adjusting screw with a butterfly nut which is received into a grooved ring attached to the lower end of the handle of the right blade.

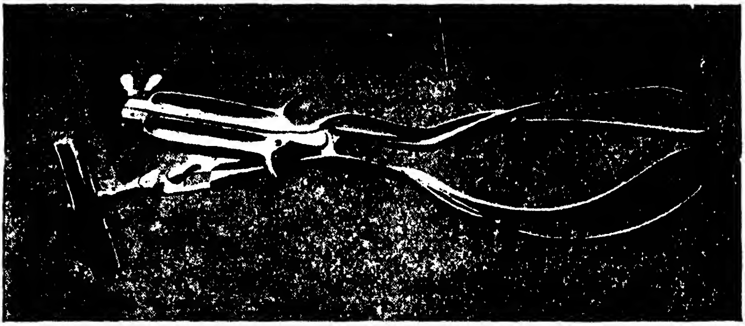


FIG. 844.
Das's Axis-traction Forceps.
(Das).

1912. Jaks.

Jaks showed a new model of forceps with a marked bending of the blades against the handle before the International Congress of Obstetrics and Gynæcology, held in Berlin, 9-13 September 1912.

1913. Stack.

Dr. E. C. Stack (Burton-on Trent) writes: The advantages I claim for the design of tractor, are that the forceps have the very simple attachment of the original "Neville" which enables them to be used equally well with or without the tractor. They differ from and are superior to the original "Neville" in that the latter were admittedly not in the real

pelvic axis, while my tractor, $1\frac{1}{4}$ in. longer in the longitudinal limb, gives practically the same axis of traction as Milne Murray's and the other more recent instruments; an axis through which force is much more economically applied. (See fig. 845).

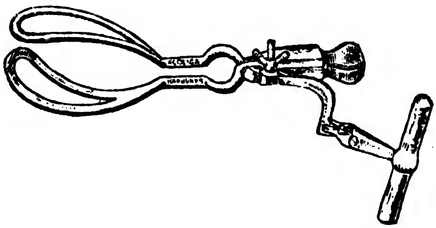


FIG. 845.
Stack's Forceps.
(Brit. Med. Jour.).

1915. Irving.

Frederick. C. Irving of Boston has modified the Tarnier traction device, applied to the long Simpson forceps, (fig. 846).

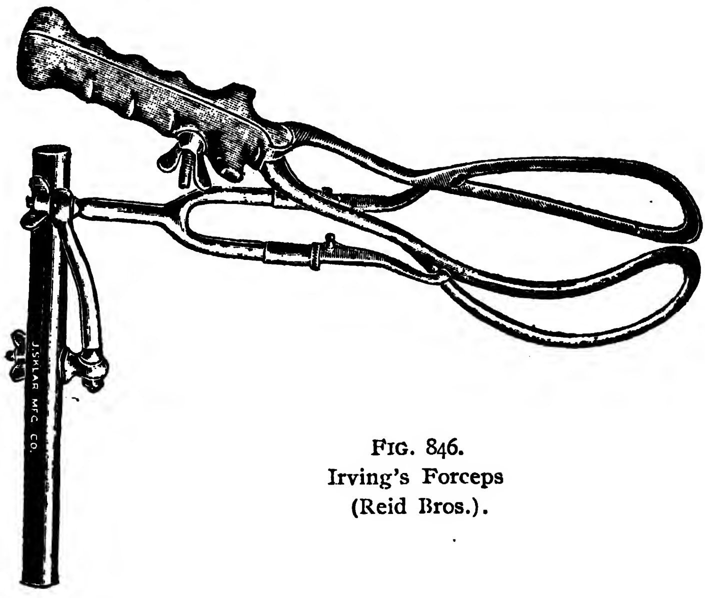


FIG. 846.
Irving's Forceps
(Reid Bros.).

The various parts of the instrument are shown in fig. 847. The traction rods, A. A, are two flat pieces of steel, easily detachable for cleaning but at other times carried on the under surface of the shanks of the forceps and held in place by knob-headed pins which impinge upon the inner margins of the shanks in exactly the same manner as on the forceps designed by Friedman. After the forceps are applied to the fœtal head the traction rods are released by gentle pressure upon the heads of the pins. Each flat rod is then inserted into the outer side of the Y-shaped traction attachment,

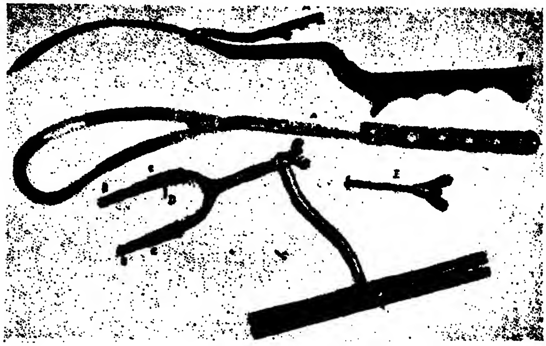


FIG. 847.
Irving's Forceps.
A, A, traction rods; B, B, Y—Shaped traction attachment; C, C, collars; D friction spring; E, handle—lock; F, set screw.
(Surg. Gyn. Obs. XX).

B, B, which is slotted to receive it and so cut, that it forms a double mortise joint. The diameter of the round arms of the Y-piece is exactly the same as the greatest breadth of the traction rods entering them. Consequently the two tenons on each traction rod extend in their respective mortises through the arm to the inside. With the rods in place, the tubular collars C, C, are pushed up until their ends impinge upon the shoulders which carry the knob-headed retaining pins. Each collar is at all times prevented from slipping by a friction-spring, D. This makes a coupling of such great strength and rigidity that the

long arm of the traction device from the wingnut at its end to the button which holds the rod in the eye of the blade is, in effect, one piece of metal.

The handle-lock E is from the Good forceps and the set-screw F which prevents undue compression, from the Elliott instrument.

The Simpson forceps presents several advantages. It has a correct cephalic and pelvic curve, a simple lock which permits easy articulation, and handles which approximate when the instrument is properly applied, thus preventing serious pressure on the baby's head.

The system of traction rods on the Tarnier forceps has a generous perineal curve and must be carried so low when the operator attempts to make traction in the axis of the superior strait that the perineum is often torn and the rods contaminated by rubbing over the anus. Correct traction in the axis of the superior strait is impossible with absolutely straight rods, as the axis itself if continued downward passes through the tip of the sacrum. The Tarnier traction device has three swivel joints operating in three planes of space. This gives the effect of a universal joint and permits the head to follow its own natural path during delivery. Rotation to the arch and extension at the proper time are allowed with as close an approach to nature as is possible with any instrument.

1915. Wichmann.

S. E. Wichmann M.D. of Helsingfors constructed a new forceps—the "Forceps Fennica." In the construction of the instrument, he made the following conditions necessary.

(1) The whole forceps must have as smooth and simple surfaces as possible; its structure, and especially its handles, must be light.

(2) It must be able to be used for a low-standing head at least just as advantageously as the best so-called low forceps, *e.g.*, J. Simpson's and Naegele's.

(3) It must be able to be used for a high-standing head at least just as advantageously as the best so-called

axis-traction forceps, *e.g.*, Tarnier's and A. R. Simpson's.

(4) The traction attachment must always, even during the operation, be able to be put on and taken off in a second by means of an automatically acting lock so that thereby the low forceps becomes an axis-traction forceps and vice versa.

In order to be able to carry out conditions 1 and 2, I selected a model closely reminding one of Simpson's forceps (Fig. 848). The simple English lock and the smooth surfaces render cleaning easy and best spare the soft parts of the mother. This lock obviously does not constitute any hindrance, as the French lock, for crossing the branches, and it has even appeared to me always to act more smoothly than the French lock during the closing of the lock in high applications. In order to begin that important part of the operation one required to have the blades placed only approximately diametrically, as the oblique articular surfaces guide them gradually to seek the exact position round the head, while the operator can clearly perceive every resistance which can be made and thereby be prevented from using force. The corresponding part of the manoeuvre with Tarnier's forceps must either be carried out without the guidance of the lock or the forceps must be locked before the branches are absolutely parallel with the help of the screw. In the latter case no feeling or resistance to the movements of the blades can be perceived, the parallelizing of the same takes place on the spot, the resistance is overcome with the help of the screw and lesions of the infant's head can more easily arise.

Apart from introducing the English lock, crossing is to some extent facilitated by reducing as far as possible the branched ends of the handles. I did not wish to remove them entirely, because they give a welcome support to the little finger when applying the blades and secondly because with a height of 1—1½ cm. they are a less hindrance during crossing than the 1½ cm. high shoulders (Fig. 851).

These shoulders are obviously necessary in order that the forceps may be used as comfortably as possible in low applica-

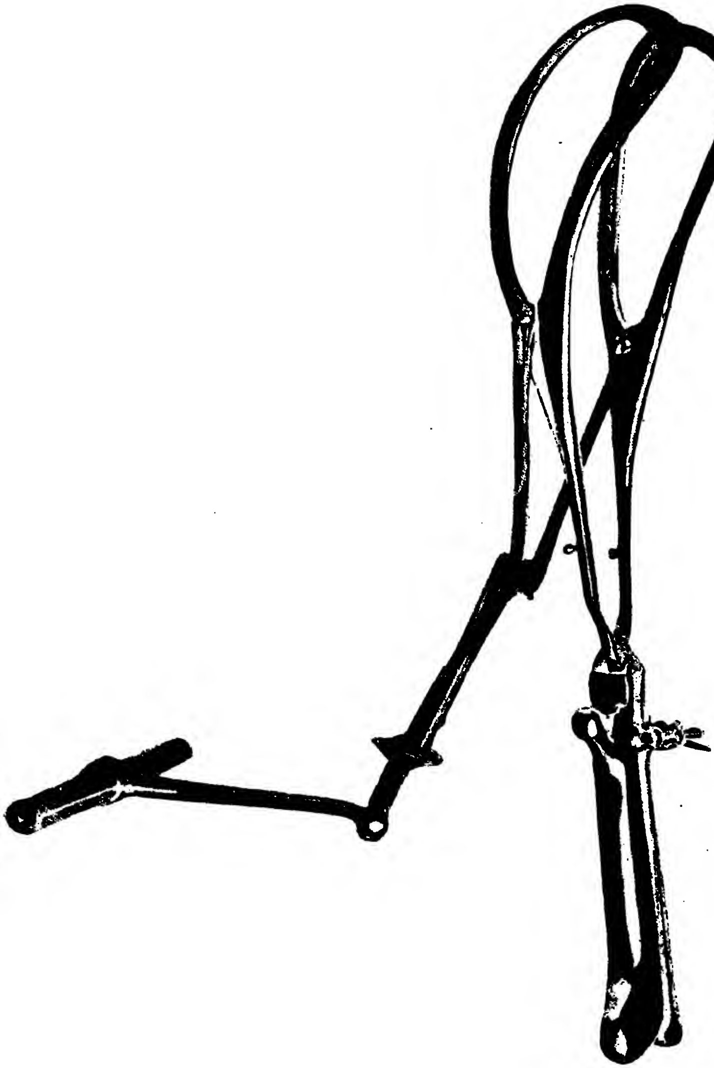


FIG. 848.
Wichmann's "Forceps Fennica."
(Jour. Obs. Gyn. Br. Em. XXVII).

tions. By reason of their shortness they have not proved any obstacle even in the highest applications, and their rounded form excludes the danger of lesions of the outer genitalia. Placed about $1\frac{1}{2}$ cm. from the lock they are sufficiently near it to allow the middle finger during tractions on a low-standing head to rest comfortably on the lock between the shanks.

By having the handles made hollow I have endeavoured to reduce their weight as far as possible and at the same time retain a suitable shape.

The shanks are so constructed that outwardly projecting part, intervening between the point where they leave the lock and the point where they become parallel, is bent; on the right side the bend is downwards, and on the left side, upwards (Figs. 852 and 853). Thus the parallel parts come to lie on the same level, and the proximal ends of the traction rods, when applied to the under surface of the shanks, also come to at the same level; this, as will be seen later, is of special importance in joining them to the traction attachment. I have made that part of the shanks, which runs from the point where they cease to become parallel to their junction with the blades, less strongly curved than in some English models, and more in the shape of a bow (Fig. 851). My reason for this is that I consider the proximal parts of the blades in such a model as Simpson's for example, as too broad and liable to cause excessive distension, and even rupture, of the vulva. While the proximal part of the cephalic curve of the forceps has retained at Simpson's measurement, with 8.2 cm. Even the distance between the tips of the blades is the same, 2.5 cm. With this cephalic curve, and by observing the above given conditions for a correct use of the fixation screw, I have not been able to observe any tendency for sliding. This degree of curvature also appears to me to be very convenient for introducing the blades.

The relatively low pelvic curve in some of A. R. Simpson's models, 7—$7\frac{1}{2}$ c.m., I have lessened to 6—$6\frac{1}{2}$ cm., as compared with other models (Tarnier $8\frac{1}{2}$ cm.; Naegele $9\frac{1}{2}$—10 cm.). During my operations with forceps and experiments with forceps of different pelvic curves, it has seemed to me as if applications

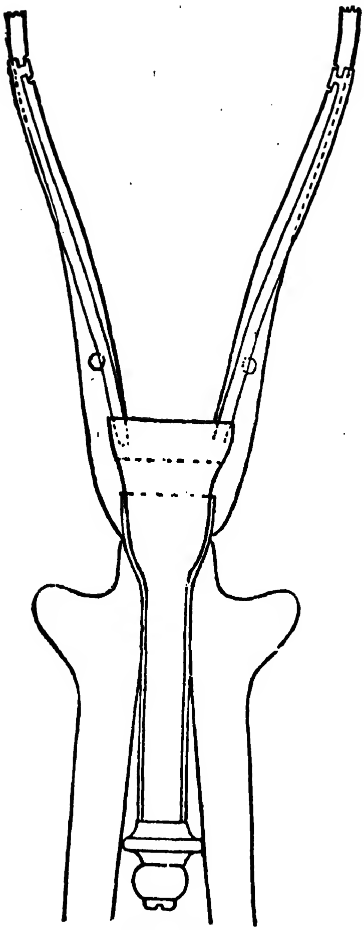


Fig. 849.
Forceps Fennica.
Socket enclosing the ends of the fixed converging traction-rods.
(J. O. G. Br. Em. XXVII).

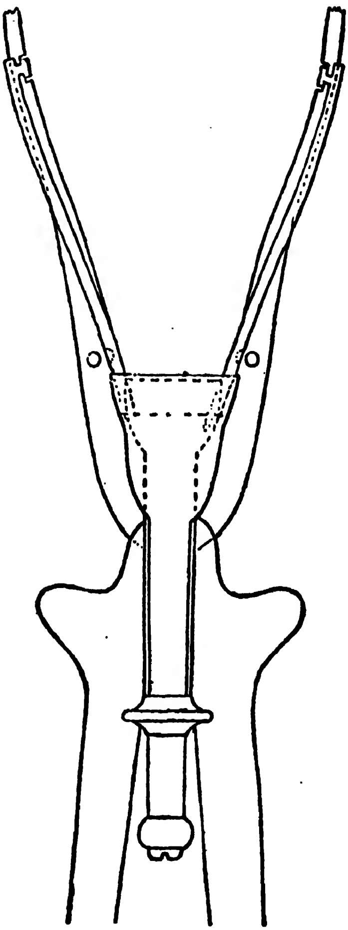


Fig. 850.
Forceps Fennica.
Traction-rods free, fastened on to the traction-attachment.
(J. O. G. Br. Em. XXVII).

in the oblique diameter in cases of high-standing heads are rendered specially difficult when forceps have a high degree of pelvic curve. This is also easily explicable theoretically.

If one imagines the Tarnier forceps applied to the head at the pelvic inlet, so that the blades lie in the antero-posterior diameter of the pelvis, the handles deviate markedly to the side corresponding to the concavity of the pelvic curve. The higher the head the greater will be the deviation, and the labia or ischial rami form an obstacle to the correct application of the blades to the head. If, on the other hand, the handles are made to lie in the sagittal plane, the higher the head the more do the tips of the blades deviate to one side and come into contact with the wall of the uterus.

The best axis-traction forceps, Tarnier's and Simpson's, are constructed with the idea of applying them in the transverse diameter of the pelvis; in such a case their pelvic curve is suitable, but when they are applied in the oblique diameter they are not so suitable. But, as in actual practice, one is nearly always compelled to apply them in the oblique diameter, a lower degree of pelvic curve seems desirable. Further, a low degree of pelvic curve is also suitable when the head lies low in the pelvis. In planning the pelvic curve of my forceps I have taken their satisfactory application to a high head in the oblique diameter of the pelvis, as the standard to be attained. A pelvic curve of 6—6½ cm. has been found the best.

The fixation screw is somewhat different from Tarnier's and Simpson's models. It is situated about 2½ cm. from the lock (in Tarnier's forceps 3½ cm., in A. R. Simpson's 2 cm.) therefore about 1 cm. proximally from the traction surface of the shoulders. As the screw itself is only 3½ cm. long there cannot be any obstacle to the application of the fingers on the shoulders, be it closed or open (Fig. 852). The screw is besides movable only in the frontal plane of the forceps—not in the horizontal plane (A. R. Simpson) or in all possible directions (Tarnier)—so that it always will rest behind the shoulders. It falls naturally into the place where it is least in the way during traction. By this simple arrangement the use of the fixation screw has been made much more convenient than in Tarnier's forceps. In low applications

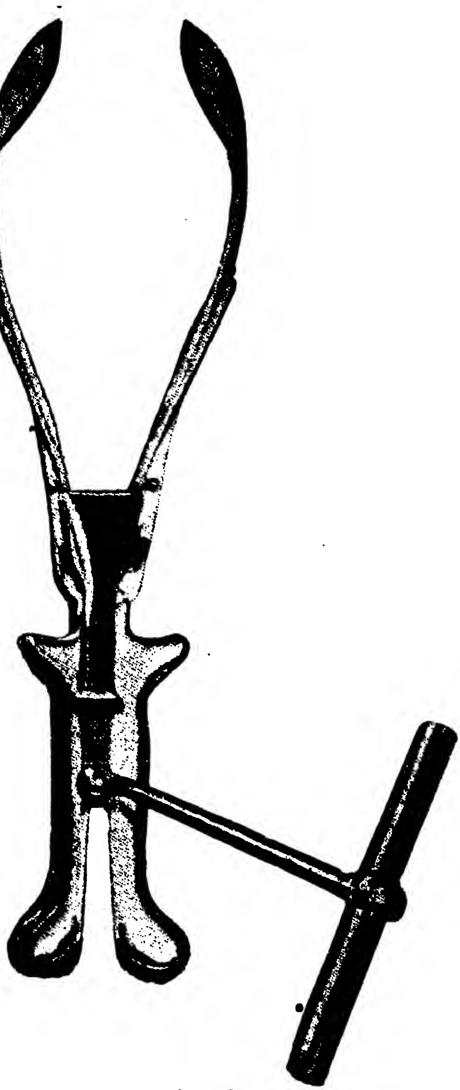


FIG. 851.
Forceps Fennica.
The socket pressed against the shanks; the traction-attachment is ready to be removed.
(J. O. G. Br. Em. XXVII).

where the screw does not need to be used there is no obstacle for the convenient carrying out of the operation. In high forceps operations, after the blades have been applied and the screw thrown over into its socket, I have only to give the screw-nut some strokes of the finger so that it comes in contact with the socket. There has been no question of any further screwing. No tendency for sliding in this mode of procedure has been observed by me, although quite a high degree of movability for the infant's head within the forceps has been retained. For example, in a forceps application to a head lying high in the pelvic cavity, during traction with a fixed screw, I have observed quite a considerable rotation of the head within the forceps.

In the construction of the traction attachment for my forceps I have deviated from the most perfect models of Tarnier's forceps, in 1882, when Tarnier issued his last model of the traction attachment, he spoke of the desirability of being able to simplify that apparatus, "mais c'est la un premier modele que je voudrai rendre plus simple ce qui, je l'espere, ne sera pas tres difficile a realiser si j'en juge par quelques essais en voie d'execution" (p. 412). A simpler, and at the same time better, model has not yet been found, notwithstanding that the weak point in question in Tarnier's forceps has generally been recognized (*e.g.*, Bumm, l.c., p. 2291).

In Tarnier's forceps the traction rods are inserted into the inner sides of the blades. I have caused the traction rods to be inserted into the outer sides of the blades, and have found a simpler, so to say automatically acting, lock for the traction attachment. The proximal ends of the rods can be fixed to the under surface of the shanks by rounded metal pins (Figs. 848—853). There is a groove on the outer surface of the blades for the reception of the rods; this groove allows the rods free play, and when loosened from the pins on the shanks they can readily drop in spite of their convergence brought about by the fixation of the traction attachment.

In principle, the fixation of the traction attachment is much the same as in Tarnier's forceps. The socket is broader so that it can enclose the proximal ends of the traction-rods, in their

FIG. 852.
Wichmann's Forceps.
The left blade.

FIG. 853.
Wichmann's Forceps.
The right blade.

(Jour. Obs. Gyn. Br. Em. XXVII).

fixed position under the shanks, to the extent of about 1 cm. of their length. When the socket is pushed unwards along the ends of the traction-rods to the extent of 1½ to 2 cms., it tends to force the rods together and disengages them automatically from the metal pins on the under surface of the shanks. By a lock in the form of a bolt, as in Tarnier's forceps, the traction attachment can then be fastened on to the rods, and traction can be commenced at once.

After the traction attachment has done its duty and the infant's head is on the bottom of the pelvis, the attachment is removed as easily and simply as it is attached. The socket is pressed against the lower surface of the shank so that the proximal ends of the traction-rods lie between the metal pins (Fig. 851). The bolt is opened and the socket is drawn out, whereby the traction-rods of themselves become fixed between the metal pins. The remaining part of the operation is as with an ordinary forceps: the fixed traction-rods are no obstacle.

By certain small alterations in the Tarnier bolt apparatus it has also been possible for me to unite in a moment and again remove the traction attachment. With its short handle-bar, its exceedingly simple movements and few screws, my traction attachment is very easily managed. The smooth surfaces and rounded edges exclude all possibility of any lesion in the maternal parts and facilitate cleaning.

By reason of the above-mentioned facts I consider that my new forceps model fulfils all the conditions set down by me above for a forceps which can claim to be used in all possible forceps operations just as advantageously as the earlier models together. For as a high forceps, it unites the best qualities of Tarnier's and Simpson's models, and by its relatively small pelvic curve ought to be considerably easier to apply correctly on a high-standing head; and as a low forceps, it is every bit as conveninent as the best previous models since the fixed traction-rods (which, by the way, can be completely removed) do not constitute the slightest obstacle for an ordinary low application.

As a result of the introduction of the new traction attachment it can be laid down that no obstetrical specialist or

general practitioner requires to have two instruments. Everyone can always use the same forceps and in easy cases can acquire the facility in using the instrument which he requires in the difficult high applications. From the economic side the price of the new forceps obviously will be much lower than the prices of a high and low forceps together.

I must still mention in a few words an advantage which has been gained by my new forceps model. Both in the German and French manner of placing the forceps in the pelvic inlet, the forceps as a result of the strongly-marked pelvic curve has not correctly seized the infant's head in the majority of cases, and after the latter has subsequently been drawn down into the pelvic cavity it has often been deemed desirable to take the forceps and reapply it in a better position, whereby according to Lusk and Thomas the high forceps has often been exchanged for the low. Of the approximately 200 so-called high forceps deliveries which have, during the last twenty-five years, been carried out in the Maternity Hospital at Helsingfors, there have been deviations from this mode of procedure in only a score of easier cases in which the operation was carried out with Tarnier's or Simpson's forceps. As a rule two forceps have been used in an operation. Objections have certainly been made to this mode of procedure, and although it is possible to manage with the high forceps in the pelvic outlet, nevertheless the desirability of a change of forceps has remained a fact. The convenient execution of the operation has been first rendered possible by my new model.

There is still another advantage. As has been previously stated I have been able to establish in my forceps operations that with my forceps, thanks to the less pelvic curve, I have been able with greater ease to apply the forceps correctly to the infant's head in the pelvic inlet. For example in a case of generally contracted and somewhat flat pelvis where the sagittal suture lay in the transverse diameter, I succeeded in applying my forceps in the left oblique diameter so that the marks round the infant's head indicated an absolutely correct hold.

By reason of its large cephalic curve my forceps seizes the infant's head during strong traction chiefly with the peripheral third of the blades, not so much with their centre. Thereby is rendered possible something which I have had opportunities of directly verifying, *viz.*, a rotation of the head within the forceps both during traction and during the pauses. Both these deviations in the curve of the forceps blades from Tarnier's model facilitate therefore changes in the position of the head during its progress through the genital canal, and render a fresh application of the forceps unnecessary in the vast majority of cases. In 25 high operations with my forceps I have found that there were reasons for such applications only in the case where the infant's position was dorso-posterior, and the first application had to be made with the concavity of the pelvic curve towards the face of the infant. The advantage of as few forceps applications as possible in this operation is apparent to all.

I have already previously mentioned that Tarnier specially laid down the requirement that, for the infant's head to be able to go through its normal changes of position, the tractions must be carried out by means of the traction attachment even during the passage of the head though the pelvic cavity, not alone in the pelvic inlet. This condition must even nowadays be considered fully justified, as these changes of position take place while the infant's head is in the pelvic cavity. It is only the complicated construction of the older axis-traction forceps and the inconvenient method of using them which has brought it about that the classic forceps is still generally used as soon as the head has passed the pelvic inlet even if it is not yet "rotated."

By means of the simple lock system in the traction attachment in my forceps the change from the ordinary forceps to an axis-traction forceps has become so simple and easily executed that the operation becomes in no way complicated by the use of the traction attachment. As above-mentioned, my forceps has certain advantages which do not interfere with the changes of position of the head in the pelvic cavity. I can now therefore on good reason lay down the condition that the

obstetric forceps must be used armed with the traction attachment as long as the infant's head is above or in the pelvic inlet or in the pelvic cavity; only when the head rests on the pelvic floor "rotated" is the traction attachment unnecessary and can for convenience sake be removed.

Especially does the use of the traction apparatus appear to me important in cases of slow rotation of the infant's head. By carrying out the traction with the one hand and by lightly exercising pressure on the forceps with the other hand in the desired normal direction of rotation, the change of position can undoubtedly be brought about in a much less dangerous way than is possible by using ordinary forceps.

The advantages which my new forceps seems to promise for practical obstetrics seem to be specially great as far as Finland is concerned. Only a very small portion of pathological deliveries are treated in the maternity hospitals, the vast majority of women in child-birth remain at home. The nearest practitioner is summoned, often in quite a late stage of delivery when there is already danger for the mother and the child. The doctor has then often to choose between perforation of a living child or an attempt to deliver the woman with a "high" forceps. The relatively numerous forceps applications on a high-standing head which are and will continue to be specially necessary in the country districts in Finland demand on the part of the practitioner great attention to that difficult and dangerous operation. Obviously in the treatment of such cases the estimation of the woman's general condition plays the chief part, but on the other hand special attention must be given to the technical difficulties in carrying out the operation. An endeavour to avoid these difficulties and render the operation itself as simple as possible has been the incentive to all the modifications I desired to have carried out in my new forceps. As it seems to me to be specially adapted to Finish conditions, I wished, with the ready consent of my colleagues, to give it a suitable name—other children discharged from the maternity hospital also receive their names—and have called it the "forceps fennica."

For the sake of comparison I wish to give here some measurements for Tarnier's, Simpson's and Naegele's forceps and for my forceps. They show that no very considerable changes in the dimensions of the forceps were necessary in the new construction.

Without the traction attachment, the example of Tarnier's forceps in use in the maternity hospital at Helsingfors weighs 660 gr., with the traction attachment 950 gr. The Simpson's forceps which is in use weighs with traction attachment fastened to it 750 gr. With regard to Naegele's forceps it is said that the weight must not exceed $\frac{3}{4}$ gr. (sic.). Without the traction attachment my forceps weighs 650 gr., with it 920 gr. The weight of the traction attachment, 270 gr., is therefore almost a third of the whole weight. This relatively high weight in practice does not have any ill effect, because the whole time the traction attachment is supported by the operator's hand. The most important thing is to have the weight of the handles reduced as far as possible and by making the handles including the shoulders (which in the example weighed are solid) hollow I hope still further to be able to reduce the weight of the instrument.

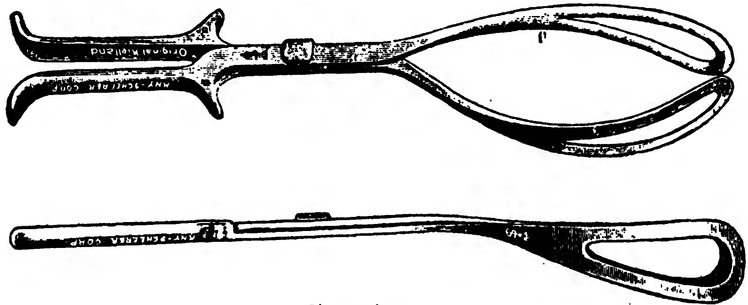
Some measurements of length may here be added. The distance between the tips of the blades to the insertion point of the handle bar of the traction attachment is in Tarnier's, Simpson's and my forceps 36 cm.

The distance from the insertion point of the traction-rods at root of the blades to the handle-bar: in Tarnier's 24.5, in Simpson's 25.5, and in my forceps 25.0 cm.

The whole length of the instrument: in Tarnier's 38.5, in Simpson's 37.0, in my forceps 38.0 in Naegele's forceps 40—45 cm.

The distance from the points of the blades to the lock: in Tarnier's 24.5, in Simpson's 22.5, in my forceps 23.5, and in Naegele's 25—30 cm. When closed the distance between the tips of the blades is in Tarnier's 2.0 in Simpson's 2.5, in my forceps 2.5 cm., and the width of the cephalic curve is in Tarnier's 7.0, in Simpson's 8.2, and in my forceps 8.2 cm.

If the width of the cephalic curve is increased to 10 cm. by opening the forceps, the distance of the tips of the blades from each other is in Tarnier's 5.7, in Simpson's 5.0, and in my forceps ca. 5.3 cm.



FIGS. 854—5.
Kielland's Forceps.
Upper fig. front view. Lower fig. side view.
(Amer. Jour. of Obs. and Gyn. VII).

1915. Kielland.

In May 1915 Christian Kielland of Norway presented a new type of forceps before the Munich Gynæcological Society. The new instrument differs from the ordinary type of forceps in the following respects: It is somewhat lighter in structure,

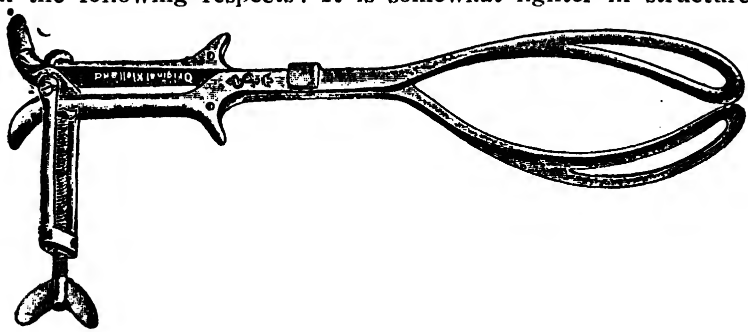


FIG. 856.
Additional Lock to Kielland's Forceps.
(Cent. f. Gyn. 1927).

its lock is not fixed but is sliding in character, and it has only an extremely small pelvic curve. The shape of each blade resembles that of a German bayonet. (See figs. 854-5). Kielland

also devised a new method of applying these forceps and laid down rules for the application of his forceps to a head which lies in the transverse diameter.

An additional lock for Kielland's forceps has been devised by Riediger which may be used on dead fœtus before perforation. (See fig. 856).

1916. Beck.

C. A. Beck has designed a forceps in which the cephalic portions of the blades become mobile by turning a key placed at the bottom of each handle. By this arrangement one or both can instantly be either fixed or liberated. In the high operation a rigid forceps when seizing an asynclitically placed head at the brim, will tend to pull it down in this position

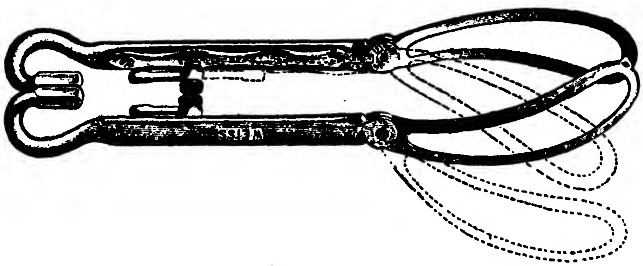


FIG. 857.
Beck's Forceps.
Improved Model.
(Lancet 1916 ii).

at the expense of much unnecessary force. Mobile blades in such cases favour a gradual correction which the uterine contractions are endeavouring to establish. Tarnier's axis-traction forceps with their joined lever arrangement, enabled the fixed blades to rotate whilst traction was employed. This freedom of the forceps to follow the movements of the head constituted the great advantage of his instrument. The present forceps with their mobile blades will favour a natural rotation in practically any line of traction; the blades when free will automatically adapt themselves to the sacral curve. By the fixation or liberation of one or other blade with light traction

an occipito-posterior position may be made to rotate anteriorly. To sum up, the advantages are:—

1. The movable blades allow the head to mould and adjust itself to the larger pelvic diameters of the parturient canal without the resistance of the ordinary fixed forceps.

2. Traction need only be a straight pull—not necessarily

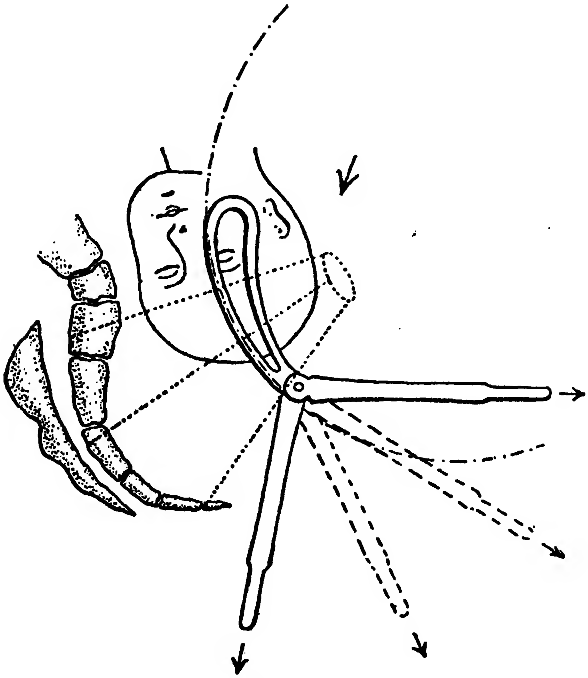


FIG. 858.
Beck's Forceps.
Diagram shows advantage of traction.
(Lancet. 1916 ii).

backward (in high operations)—hence no undue stretching of the perineum and lacerating of the soft parts.

3. By the liberation of one or other blades the head in an O.P. or M.P. position may be made to rotate anteriorly.

4. They combine the advantages of an axis-tractor without the complicated lever mechanism and its difficult application.

5. The blades can rarely slip—even when faulty traction is applied. (See figs. 857-8).

1922. Farmer.

E. W. W. Farmer designed an improved axis-traction lever as he was not satisfied with Le Page's tractor. His tractor secures a better hold and is easier of application. The force is exerted on the *shanks* of the forceps, not on the handles, so that the leverage is in the more direct axis, and the instrument is consequently more efficient. (See fig. 859).

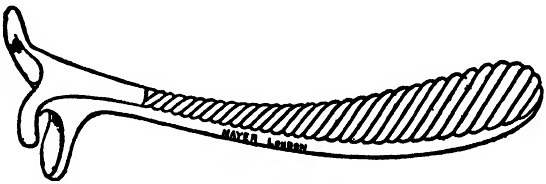


FIG. 859.
Farmer's Axis-traction Lever.
(Mayer and Phelps).

1923. Foulkrod.

Dr. Collin Foulkrod presented a paper entitled a Modification of Axis-Traction Forceps before the Obstetrical Society of Philadelphia at its meeting on 1st March, 1923. He said: "In the existing forceps there have been some few points which in my experience have needed correction. The shanks of the Simpson forceps are unnecessarily broad and will often start the cracking of the mucous membrane of the perineum before traction can be performed. This alone can be avoided by cutting the perineum. We believe that many of the vaginal tears are started by the pressure of these wide shanks against the wall just under the bladder. We have found no better cephalic curve than that of the Simpson forceps and with such a curve and the shank attached as in Tucker-McLean forceps we have secured in our opinion a safer instrument. The lock of existing axis-traction forceps is a snare and delusion and impossible to close quickly and always in the road. We have therefore used a large button to hold

the notch of the second blade and have placed on the top of the shank a lock with a shoulder on both sides which can be used in *somewhat* the same fashion as the Elliott set screw to prevent active pressure on the child's head. The traction bar as used on the Dewees forceps has given me very good results."

1924. Bill.

Arthur Holbrook Bill, A.M., M.D., F.A.C.S. Associate Professor and Head of Department of Obstetrics, School of Medicine, Western Reserve University and Obstetrician-in-Chief

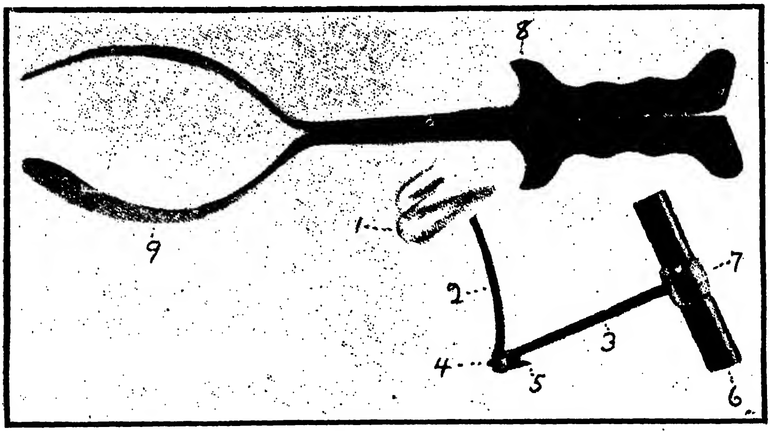


FIG. 860.
Bill's Forceps.
Front view.
(Tr. Am. As. of Ob. and Gyn. XXXVI).

to the Maternity Hospital of Cleveland, showed before the American Association of Obstetricians, Gynecologists and Abdominal Surgeons at its annual meeting held in September, 1924, a new axis-traction handle for solid blade forceps, "to complete the equipment of an ideal forceps". Dr. Bill "does not use the instrument in high forceps work but routinely uses it in low and medium forceps cases. "The purpose is to increase the accuracy of traction and thereby minimize the force." (See figs. 860-1).

The traction handle consists of a claw (1) which grasps the handles of the forceps (8) very much as two fingers would grasp them in ordinary traction. The vertical rod (2) joins the claw to the horizontal traction rod (3) in a movable joint (4) and is sufficiently long to reach a line drawn through the axis of the forceps blades (9). The indicator (5) points in this line and when traction is made in the proper direction, points in the line of the rod (3). The grip (6) is attached to rod (3) by a movable joint (7) to allow perfect freedom in traction.

To apply the handle simply slip the claw over the forceps handles. It is thus very easily removed between pulls.

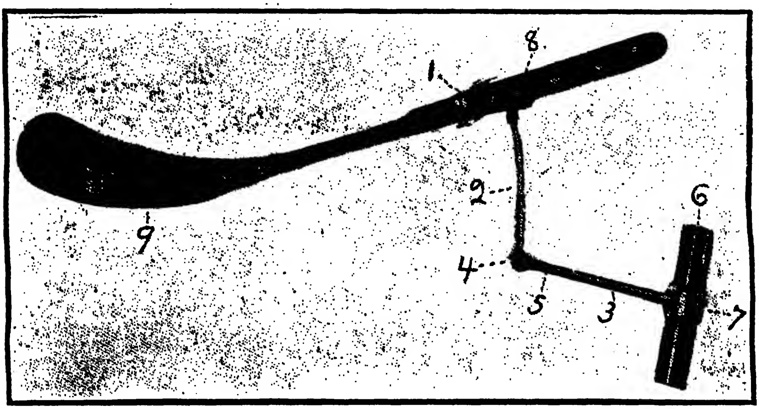


Fig. 861.
Bill's Forceps.
Side view.
(Tr. Am. As. of Ob. and Gyn. XXXVI).

The movable joint (4) allows the handles to rise as the head descends and as they do so, the indicator (5) shows the direction in which traction should be made.

1925. Barton.

Lyman G. Barton presented his new obstetric forceps at a meeting of the New York Obstetrical Society on November 10, 1925. A joint communication on the subject by Barton, Caldwell and Studdiford from the Department of Obstetrics

and Gynecology, College of Physicians and Surgeons, Columbia, University, appeared in the January, 1928, issue of the American Journal of Obstetrics and Gynecology. The following description of Barton's forceps is reproduced from that paper:

"These forceps differ from the usual types in that the blades join the shanks at an angle. This angle is the normal angle between the axis of the superior strait of the pelvis and the axis of the pelvic outlet .... Owing to the peculiar shape of the anterior blade, for the purpose of application it is necessary to incorporate a joint at the junction of blade and shank. By means of this joint, the blade can be swung through an arc of a circle until it is nearly parallel with the shank. The lock of the forceps is so constructed that a

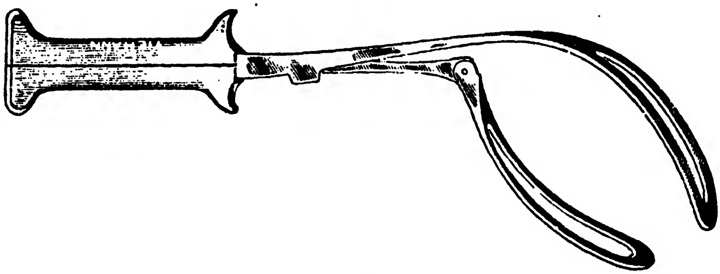


FIG. 862.
Barton's Forceps.
(George Tiemann & Co.).

gliding motion of one member on the other is permitted; this insures the adaptability of the blades to heads of varying sizes without destroying the symmetry of the space between the blades. (See fig. 862).

The axis-traction attachment consists of the customary cross-bar handle pivoted on the end of the traction rod. The other extremity of the traction rod is pivoted to the yoke which partially encircles the shanks of the forceps. On one side of the yoke is a lug through which passes a tension bolt, the horizontal portion of the tension bolt lying in vertical slots on each side of the yoke. To apply the axis-traction attachment to the forceps, loosen the winged-nut sufficiently to permit the tension bolt to be raised from the vertical slots

and rotated ninety degrees. Apply the yoke to the forceps shanks from below, rotate tension bolt to proper position for its horizontal portion to enter the vertical slots and tighten the winged nut." (See fig. 863).

Dr. Barton got the idea of his instrument from observing that dentists used a different type of extracting forceps for

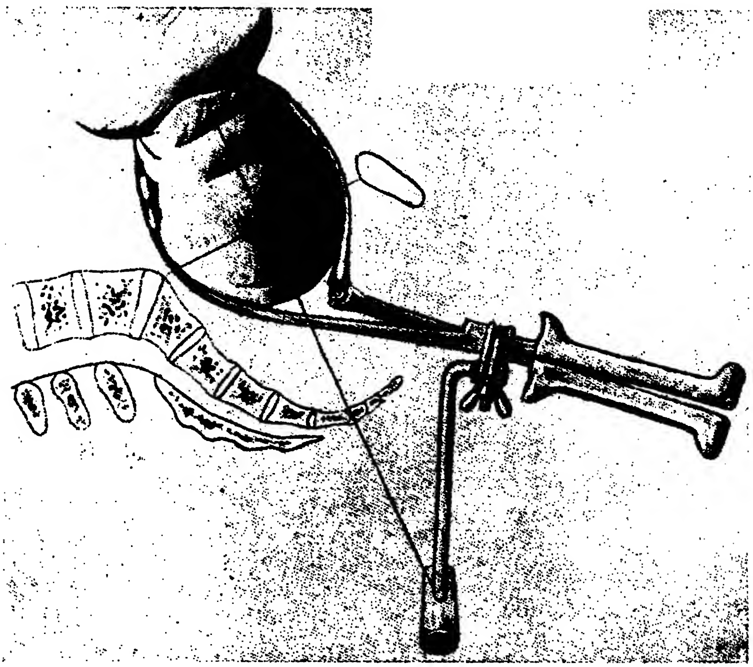


Fig. 863.
Barton's forceps with axis-traction attachment.
The handle of axis-traction attachment is in a line with the axis of the superior strait.
(Amer. Jour. Obs. and Gyn. XV).

the molars than for the incisors. He believed that we were attempting deliveries in the upper pelvis with forceps which were designed for the lower pelvis and which could only be used to best advantage at this point. With the idea that there should be an entirely different principle in forceps intended for high application, especially in transverse and

occiput posterior positions he designed the instrument described above.

Dr. Barton made the first drawing of this forceps more than 20 years ago. It was not until the first model was made in 1923 that attention was attracted to the possibilities of such an instrument.

In a review* on the use of the Barton obstetric forceps, Carl Bachman of Philadelphia drew attention to the following peculiarities of this forceps, *i.e.* (*a*) No pelvic curve. (*b*) Lightness of construction. (*c*) Absolute flatness of the cephalic surface of the blades and absence of cupping in the cephalic curves.

Dr. Bachman gives the following extracts from a letter by Dr. Barton, which should be historically interesting:—

"The purpose for which the instrument was invented was to construct a forceps that would be applicable to the biparietal diameter of the head in cases of arrest of the head at the pelvic brim, without disturbing the relation of the head to the pelvic axis. I never saw or heard of the Kjelland forceps until several years after my drawings were made so I can scarcely say that they were designed as an improvement on that instrument .... As to original dates I would say that the idea of constructing a forceps with the blades at an angle to the shanks occurred to me over 20 years ago. A rather crude model was constructed and I had a conference with the late Professor Cragin, of Columbia University, in regard to this modification of the forceps. His opinion was that while the idea might be correct in theory it would not work out in actual practice. Acting on his advice I did nothing further with the forceps until 14 years ago. At that time I had drawings of the perfected instrument and these were given to Professor Studdiford for his opinion. He agreed with Professor Cragin and consequently the project was again abandoned. In 1924, I exhibited a drawing of the forceps to Doctor A. D. Campbell, of Montreal, who at once grasped the significance of the design and advised me to have the

*Surg. Gyn. & Obs. 1927, XLV. p. 805.

forceps made at once. The first pair was completed about the middle of October, 1924, and Professor Studdiford had, in some way, heard of it and asked me to show the forceps to him as soon as completed. During the Clinical Congress of the American College of Surgeons held in New York City in October, 1924, I exhibited them to both Professor Studdiford and Doctor Caldwell. Both were very skeptical as to their value, but finally to settle the question, they decided to see what could be accomplished with the manikin. Doctor Caldwell was the first to experiment with them and much to his surprise he found they were easy to apply and effective in delivery. The first actual case in which they were used was during the first week of December, 1924. They were exhibited at Sloane Maternity at a meeting of the American Gynæ-

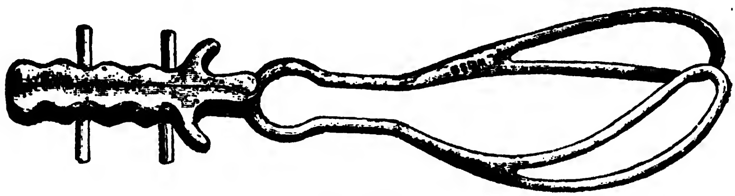


FIG. 864.
Thomasz's Forceps.
(Med. Rev. of Revs. I).

cological Club in February, 1925. At that time I think they had been used in fourteen difficult cases. I have not heard from Doctor Caldwell in regard to their use at Sloane since December, 1926. At that time there had been 106 cases at that institution."

1926. Thomasz.

Dr. C. M. Thomasz of Veynagoda Ceylon, has modified the Anderson forceps by providing two transverse bars across the handles. The advantages claimed are (1) abolition of all chance of unlocking of the blades; (2) prevention of hazardous compression; (3) non-slipping; and (4) a better and safer tractor as provided by the transverse bars on the handles.

1926. Dolsen.

Dr. William, W. Van Dolsen described a new type of obstetric forceps before the Obstetric Society of Philadelphia.

"Feeling that there was no excuse for the fenestrated blade and having seen many lacerations of the child and mother following its employment, he selected the solid blades used in Tucker McLane instrument as a basis for this instrument. Particular care is used in levelling the edges of the blades and shanks thus leaving the least possible cutting surface.

The pelvic curve of the Dewee's forceps being the greatest and giving more of the axis-traction principle, was therefore copied. The lock and cross shanks of the Elliot instrument cause less distention of the vaginal floor with subsequent danger of laceration and so it was considered more desirable as compared with the Simpson forceps.

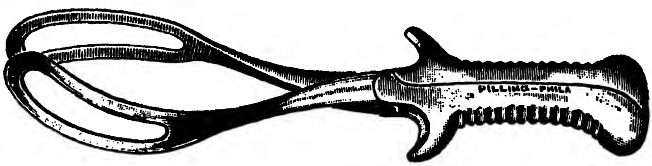


FIG. 865.
Bland's Forceps.
(Geo. Pilling & Co.).

The Elliot adjustment for holding the handles at a certain distance and avoiding undue compression on the fœtal head was used with the addition of a notch filed on the adjustment bar. This notch is placed at a point guaranteeing the adjustment of the tips of the blades at 1.5 c.m., and the diameter of the blades at their central point at 10 c.m., the largest diameter. of the fœtal head by turning the adjustment past the notch the diameter between the blades may be altered.

Noting that on all other forceps the handles are fitted with projecting wings, so small as to be painful and tiring to the fingers, he made the handles on his forceps large enough to hold comfortably two fingers on either side.

1927. Bland.

Dr. P. Brooke Bland of Philadelphia constructed a forceps which is a combination of the Simpson and Sawyer models. The instrument is exceedingly useful in low applications. He holds that it is rarely found necessary to apply forceps to the head relatively high in the pelvis and that a head that is able to pass the pelvic brim is, likewise, able if given sufficient time to reach the pelvic floor. (See fig. 865).

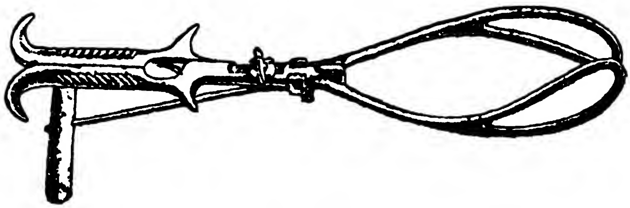


FIG. 866.
Zweifel's "Universal" Forceps.
(Winter).

1927. Zweifel.

E. Zweifel jun.* constructed a universal forceps, which could be used equally well in all the planes of the pelvis. It has two almost straight blades with a minimum of pelvic curve. (See fig. 866).

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*Winter's Lehrbuch der Operative Geburtshilfe, 1927.

SECTION IX.

CLASSIFICATION OF FORCEPS.

In his monograph on the different kinds of forceps published in 1883, Poullet attempted to classify forceps. He specially studied the modifications of the instrument which had been proposed during the preceding 30 years. He observes:—"In natural history there is a logical basis of classification but no such basis existed for an instrument which in its various forms performs one function only in the best possible manner. It is therefore difficult to classify forceps. It may be asked, what is the meaning of the word "kind" of forceps? The answer to the question depends not only on the person to whom the question is addressed but also on the period at which it is asked. Recently, an eminent obstetrician answered the query thus:—"I only know of two kinds, those which draw in the axis and those which do not draw in the axis." Those who sometimes used pliant forceps might be tempted to say that there are two kinds of forceps, the rigid and the pliant forceps. Thenance who introduced the parallel or uncrossed forceps would simply distinguish the crossed and the uncrossed forceps. Levret would have distinguished the straight and the curved forceps. A few would say that there are two kinds of forceps symmetrical and unsymmetrical. Finally there are others who would recognise two kinds of forceps, *viz.*, those by which the head will be very much compressed and those by which the head would be less compressed. It is thus evident that so far there is no basis for classification."

Poullet suggested a classification which he believed to be more logical than these which had been put forward, and which was based on the idea which evidently suggested each important modification. The original idea of the instrument must have been to seize the head in an efficient manner. The first species of forceps then would comprise all those in which the main

object of the authors was an easy and convenient grip of the head.

Later on it was found that the forceps, in seizing the head, compressed it. Attempts have been made to regulate, to utilise and to diminish, as much as possible, this compression. Instruments which utilised this function of compression of the head, may be included in the second species.

Moreover, during extraction, the head must be able to execute movements of rotation, flexion and extension. In a word it must be able to evolve, *i.e.*, to come out with movements in due sequence. Some forceps allow a freer evolution than others. The former may constitute the third species.

Lastly, some forceps have been constructed to draw the head in the proper direction.

Thus forceps may be classified into four groups:—

(1) Those constructed to assure *prehension.*
(2) Those constructed with a view to *compression.*
(3) Those constructed with a view to allow freer movement of the head during traction or easier *evolution.*
(4) Those constructed so as to economise the strength employed by traction in the proper *direction.*

Forceps may thus be classified on different basis or a combination of them, so as to include its numerous varieties. The basis of classification may be (1) Historical or Chronological. (2) Geographical or national. (3) Dimensional (Long or short). (4) Geometrical. (5) Dynamical, (6) Blade-characteristical. (7) Functional, etc.

(1) On the historical basis we may in the first instance *classify them chronologically* into certain well-defined landmarks, in its history and evolution, such as, Chamberlen (1600), Palfyn (1720). Smelli-Levret (1754), and Tarnier (1877), or we may take successive stated periods of say 25 or 50 years.

(2) The geographical or national basis refers to the particular type used in a particular country or place. Thus we have the French forceps, (Levret-Pajot, type), which is usually a large instrument, with a Levret lock consisting of a button with

pedicle giving firm fixation without ease of separation. The traction is made at the end of forceps nearest to operator. The German type of forceps is smaller with Naegele lock (sessile button on one half of the instrument giving loose fixation with great ease of separation). Traction is made by pressure on shoulders of handles, next to lock, farthest from operator. The British (or Smellie) type of forceps is intermediate in size between French and German with Smellie lock (projection on one half of forceps with a groove on the other) giving moderate degree of fixation and moderate ease of separation. Traction is applied by grasping whole handles. The American forceps is represented by that of Hodge. It combines, according to him, the excellencies of the British, French and German instruments and avoids their defects. The length of the instrument is 16 inches and its weight 26 ounces. The pelvic curve is slightly increased and to counteract any loss of power which may ensue from this increased curvature, the handles have been bent in the opposite direction. The shanks are nearly parallel, one being anterior to the other. (For detailed description see Hodge).

In America, during the nineteenth century, the Philadelphia school of obstetricians was dominant and hence there has been a preference for their forceps especially those of Hodge, Wallace and Smith. They are all provided with pelvic and cephalic curves, the latter being quite ample, metallic handles, French lock or some modification of it and are fifteen or sixteen inches long. They are fairly light in structure, the elements of the shank are parallel and they are well adapted for grasping the head in any portion of the pelvis. In New York the preference among many obstetricians for years has been the Elliot modification of the Simpson type. At the Sloane Maternity, New York, the McLane forceps with solid blades has been the favourite for many years.

The Japanese forceps are chiefly remarkable for the shortness, narrowness of and distance between the blades, also for the straight fenestræ. The lock is peculiar, being formed by an aperture ¾ of an inch in length and the same in depth, slanting upwards in each limb of the instrument at the junction

of the blade with the handle. They are made of steel, the blades being rounded off and polished, the handles square, black, and dull, terminating in two divergent flattened hooks. In addition to these main types, we hear of the Lyon Forceps, the Philadelphia Forceps, the Prague Forceps, the Bengal Forceps, the Belgian Forceps, the Swedish forceps, Forceps Fennica, etc.

(3) The dimensional basis of classification depends on the length of the instrument. The "long" forceps is 16 or 17 inches long, so that it may be used before the head has entered the brim of the pelvis. It generally possesses a pelvic curve. The "short" forceps is about 11 inches long, the distance from the lock to the tip of the blades being about 7.2 inches; the blades are fenestrated, curved on themselves so as to present the concavity towards each other, at the tips being distant 1 inch and at the centre 3 inches from each other. They may be straight or curved. The "short" forceps is also called "straight" forceps and has only the cranial curve. The distinguishing feature of "short" forceps is therefore not its absolute shortness but the absence of pelvic curve, which makes it functionally short. It may indeed be of considerable length, which in the absence of pelvic curve, is unavailable when the head is high up in the pelvis.

(4) The geometrical classification takes into consideration the shape of the instrument *i.e.*, whether it, is straight or curved not taking the head curve into consideration. The straight forceps may be long or short. In curved forceps the blades have a curve forwards from about their middle so as to adapt themselves **to** the anterior curve of the Sacrum—the pelvic curve introduced by Pugh in 1740. In addition to this, a perineal curve is described by Dr. Robert Wallace Johnson in his "A new system of Midwifery etc." 1769. See Fig. in Obs. Transactions Vol. XX, p. 144. Moreover a curve in the handle was introduced by Aveling in 1868. (See Aveling's Curves of midwifery forceps—their origin and uses—Obs. Transactions Vol. XX, p. 130). The curve above referred to, relates to prehension of the head with the forceps applied in the transverse diameter of the pelvis. The head may also be grasped with forceps

applied in the antero-posterior diameter of the pelvis. The curves of the forceps are modified accordingly as in the instruments of Uytterhoven, Baumers, Poullet, Barton, etc.

(5) The dynamical basis of classification depends upon motion as the result of force applied. It includes (*a*) method of traction and (*b*) direction of traction. The former can be subdivided into (*i*) manual or (*ii*) mechanical. The mechanical method of traction may be dynamometric thus capable of accurate estimation of the force employed. The non-dynamometric method is inaccurate as it depends upon the personal judgment of the individual operator. With regard to direction of tractions, forceps may be grouped as ordinary or axis-traction. The lever forceps of W. H. Taylor, mentioned in New Sydenham Society's Lexicon, belongs to the group of forceps with arrangements for mechanical traction.

TYPES OF FORCEPS.

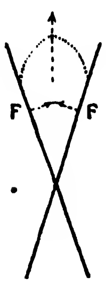

FIG. 867.
Chamberlen
(divergent).

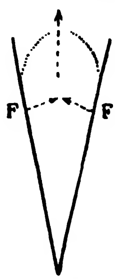

FIG. 868.
Thenance
(divergent).

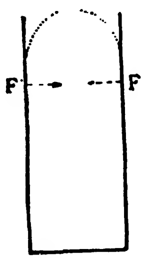

FIG. 869.
Poullet
(parallel).

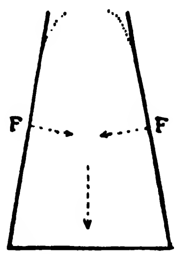

FIG. 870.
Coutouly II.
(convergent).

(Demelin et Devraigne).

(6) Blade-characteristical basis of classification takes into account the solidity or fenestration of the blades.

This basis of classification may be further subdivided as crossed and non-crossed or as Demelin elaborates it by grouping forceps into 3 categories—divergent, parallel and convergent. In the first type the blades diverge from the articulation towards the head and is the characteristic feature. In this variety there is a single articulation in the form of X or V,

situated in the median longitudinal axis of the instrument. In the forceps with V articulation, the articulation lies at the end of the manual extremity.

In the second type the branches are strictly parallel and retain their parallelism while grasping the head. With the movement which their act executes for the exact adaptation of the cephalic ovoid, all the points respectively symmetrical of the blades, and the handles approach two by two in accordance with a straight transverse line, perpendicular to the longitudinal axis of the instrument: The forceps of Palfyn, Mesnard, Poullet, Perret, etc., belong to this group. The articulation is necessarily double. The leniceps of Mattei is composed of two straight branches, strictly parallel, united by a cross piece, without a compression screw.

Lastly, in the third type, the articulation is also double but the two branches converge towards the foetal head. The forceps of Coutouly II, Chassagny and Demelin belong to this group.

(7) The functional basis of classification aims at a consideration as to how the forceps is expected to act, *i.e.*, whether as a simple extractor, of the head or to serve as a rotator or lever, or to be used as a dilator of the cervix or vagina.

The following tables are appended from authors, who attempted at a classification of forceps.

TABLE A.

From Busch and Moser's Handbuch de Geburtskunde, 1843, Vol. IV, p. 611.

I. Forceps with Cephalic Curve.

(1) Blades non-fenestrated.

(*a*) Blades, non-crossed.

(*i*) Palfyn's forceps. Siehe Mulder Historia literaria et critica forcipum et vectium obstetriciorum. Francq. 1794. Paul de Wind, Tgeklemd hoofd geredt, Middelburg 8. S. 2. Levret. observations

sur les causes et les accidens de plusieurs accouchemens graves. Uebers. oon Walbaum. Lub. u. Alt. 1758. 8. Th. I. S. 153. Lorenz Heister, Instit. Chirurg. Amsterd. 1739. 4. T. II. Tab. XXXIII. Fig. 16. Busch, die theoretische und praktische Geburtskunde durch Abbildungen erläutert. Berlin 1838. Taf. XXXX. Fig. 302.

(*ii*) Gilles le Doux's forceps. Siehe Mulder a.a.o.p. 17. Levret a.a.O.p. 156. Busch a.a.O. Taf. XXXX Fig. 303.

(*iii*) Heister's forceps. Heister a.a.O.S. 1047. Mulder a.a.O. p. 16. Busch a.a.O. Fig. 304.

(*iv*) Schlichting's forceps. Schlichting, Embryulcia nova detecta, ejusdemque appendix etc. Amst. 1747. Mulder a.a.O. page 32. Tab. II. Fig. 16. Busch a.a.O. Fig. 305.

(*v*) Rathlauw I's forceps. Mulder a.a.O. p. 30. Tab. II. Fig. 15. Busch. a.a.O. Fig. 216 b.

(*vi*) Paul de Wind's forceps. Paul de Wind a.a. O.S. 41. Tab. III. Fig. 11 u. 12. Busch a.a.O. Fig. 306.

(*vii*) Burton's forceps. Burton, Essay towards a complete new system of Midwifery. London 1751. Abbild. Taf. 18 p. 383. Mulder, a.a.O. page 40. Tab. III. Fig. 6-10. Busch a.a.O. Fig. 307.

(*b*) Blades crossed :—

(*i*) An unknown forceps. Mulder a.a. O. p. 17. Tab. I. Fig. 7.

(*ii*) Dusee's forceps. Med. essays and observations. Vol. III. Edinb. 1733. p. 320. Mulder a.a.O. p. 18. Tab. I. Fig. 8. Busch. a.a.O. Fig. 308.

(*iii*) Bing's forceps. Jancke, comment. de forcipe ac forfice ferramentis a Bingio, Chirurgico Hafniensi inventis, eorumque usu in partu dificili. Leipzig. 1750. Mulder, a.a.O. p. 35. Tab. III. Fig. 1-5. Busch, a.a.O. Fig. 309.

(2) Blades, fenestrated.

(*a*) Non-crossed.

Mesnard's forceps. Jacq Mesnard, Guide des accoucheurs. Paris 1743 p. xviii. Mulder a.a. O. p. 24. Tab. II. Fig. 6.

(*b*) Crossed.

(*i*) Freeke's forceps. Giffard's cases in Midwifery, revised and published by E. Hody. London. 1734. Mulder a.a.O. p. 19. Tab. III. Fig. 1-3. Busch a.a.O. Fig. 311.

(*ii*) Giffard's forceps. Giffard a.a. O. Mulder a.a. O. page 19. Tab. I. Fig. 9-10. Busch a.a.O. Fig. 312.

(*iii*) Drinkwater's forceps. Johnson A new system of Midwifery on practical observations. London. 1769. S. 170. Mulder a.a. O. Page. 13.

(*iv*) Chapman's forceps. An essay on the improvement of Midwifery. London 1733. Smellie theoretische und praktische Abhandlung. von der Hebammenkunst. A.d. Eng. Altenb 1755. Th. I.S. 56 u 268. Mulder a.a. O.p. 21. Tab. 1. Fig. 11-12. Busch a.a.O. Fig. 313.

(*v*) Unknown. Mulder a.a.O. p. 23. Tab. II. Fig. 4 u·5.

(*vi*) Ould's forceps. E.v. Siebold p. 279.

(*vii*) Gregoire's forceps. Böhmer, Disquisitio altera, de usu et praestantia forcipis Anglicanae in partu difficili ex situ nascendi capitis, intro ossia pubis immobiliter adhaerentis, ad R. Manningham art. obst. comp. Halle 1746. Mulder a.a. O. page 25. Tab. II. Fig. 7-13. Busch a.a.O. Fig. 314.

(*viii*) Levret's first forceps, a l'axe ambulant. Levret a.a. O. Tom. I. Tab. I. Fig. 14. Mulder a.a.O. page 33. Tab. VII. Fig. 1-3. Busch a.a.O. Fig. 315.

(*ix*) Rathlauw's second forceps. Het berngt geheim in de Vroedkunde von Rogier Roonhuysen outdeckt en eitgegeven op hooge order door J. B. Rathlauw. Amst. 1747. Mulder a.a. O. pag. 31. Tab. II. Fig. 14. Busch a.a.O. Fig. 316a.

(*x*) Smellie's first forceps. Smellie, W.A. treatise on the theory and practice of Midwifery, 1752. Vol. I. page 251. Uebers von Zeiher. Th. I.S. 260 u 269. J. G. Hoffmann. De forcipe Smelli in praxi obstetricia anteponenda vecti Roonhuysiano. Groning. 1766. W. N. Stein, De mechanismo et praestantia forcipis Levretianae. Cassel 1767. Tab. II. Fig. 2. Mulder a.a.O. page 43. Tab. III. Fig. 13 u 14, Busch a.a.O. Fig. 317.

(*xi*) Pole's forceps. Savigny. Collections of engravings. London 1797.

(*xii*) Orme's forceps. C. G. Kuhn, Diss. de forcip. obst. recens. inventis. Leipzig 1783. p. 26. Mulder a.a.O. p. 66. Tab. V. Fig. 1. 2. Busch a.a.O. Fig. 318. Kymmel (Historia literaria et critica forcipum obstetriciarum ab anno 1794 ad nostra usuque tempora Groning. 1838) giebt falschlich diese Zange. als mit Kopf-und Beekenkrummung an.

(*xiii*) Lowder's forceps. Mulder a.a. O. p. 67. Tab. V. Fig. 3 u 4. Busch a.a.O. Fig. 319. Kymmel (a.a. O.) giebt anch diese zange falschlich als. mit Kopf-und Beckenkrummung versehen an.

(*xiv*) Denman's forceps. Mulder a.a. O. p. 84. Tab. VI. Fig. 7 u 8. Busch a.a.O. F. 320. Kymmel giebt auch diese Zange als mit Kopf und Beckenkrummung versehen an.

(*xv*) Savigny's forceps. Savigny a.a. O. Mulder a.a. O. XXXVII. 1 u 2.

(*xvi*) Johnson's first forceps. Mulder a.a. O.S. 49.

(*xvii*) Rawlin's forceps. A Dissertation on the structure of the obstetric forceps London. 1793. Mulder a.a.O. page 160. Tab. XI. Fig. 3 u 4.

(*xviii*) Holme's forceps. Frorieps Notizen Bd. XXI. S. 256. Kymmel a.a. O.S. 100.

(*xix*) Lederer's forceps. Kymmel a.a. O. p. 101.

(*xx*) Casanova's forceps. Kymmel a.a.O. page 101. Transactions of the Medical and Physical Society of Calcutta. Vol. VI. Calc. 1833. p. 489.

(*xxi*) Clarke's forceps. Auserdemgehoren hierher.
(*xxii*) Walsh's forceps. Auserdemgehoren hierher.

II. Forceps with Cephalic and Pelvic Curve.

(1) Blades fenestrated.

(*a*) Blades crossed.

(*i*) Levret's second forceps. Levret suite des observations sur les causes et les accidens plusiers accouchemens laborieux. Paris 1751. Piet, sur l'usage du forceps courbe im Journal de Med. Chirurg. Pharm. etc., par Roux Sept. Paris 1771 p. 264. Mulder a.a.O. pag. 37. Tab. VII fig. 4-5 Busch a.a.O. fig. 321.

(*ii*) Levret's second forceps. a l'axe tournent. Stein d. alt Progr. de mechan, et praestantie forcip. Levret. Cassel. 1767. J. F. Sippel, forceps Levretiana utrum praestantissmum sui generis instrumentum sit an deterrimum etc. Merb. 1810. Mulder a.a.O. page 46. Tab. VII· fig. 6-17. Busch a.a.O. fig. 324.

(*iii*) Smellie's second forceps. D. W. Smellie a.a.O.S. 260. Mulder a.a.O. p. 43. Tab. III. fig. 15-16. Busch a.a.O. fig. 322.

(*iv*) Pugh's forceps. B. Pugh. Treatise of midwifery. London 1754, p. 132. Mulder a.a.O. p. 45. Tab. III. fig. 17-18. u IV 1-2. Busch a.a.O. fig. 323.

(*v*) Lauverjat's forceps. G. W. Stein. Annalen u.s.w. B.I. Busch. a.a.O. fig. 353. Kymmel a.a.O. p. 31.

(*vi*) Fried's first and second forceps. Stein's praktische Anleitung zur Geburtshulfe. 3. Aufl. Cassel 1783. S. 575. Gehler. De forcipis Johnsonianee prac Levretiana et Smelliana praestantia. Leipzig. 1790. Fries E. Diss. de usu forcipis in partu Argent. 1771. Mulder a.a.O. page 53· u 54. Busch a.a.O. fig. 325. a.u.b.

(*vii*) Leake's forceps. J. Leake, A lecture introductory to the theory and practice of Midwifery. London 1773

p. 61. Wenzel C., comparation inter forcip. Levret, Smellianam, Leakeanam et Johnsionam. Mogunt. 1791. Mulder a.a.O. page 56. Busch a.a.O. Fig. 326.

(*viii*) Plenk's forceps. Plenk's Anfangsgrunde. Wein 1774. Busch a.a.O. fig. 346.

(*ix*) Petit's forceps. Petit, Traite des maladies chrurgicales et des operat. quileur convienant par Lesue T. I-III Paris, 1774. Mulder a.a.O. pag. 58. Busch a.a.O. fig. 376.

(*x*) Coutouly's first forceps. Catalan, Journal de Paris. Samedi. 6. Decb. No. 340. Mulder a.a.O. 60. Tab. X. 1 u 2. Busch a.a.O. fig. 328. I.

(*xi*) Pean-Baudelocque's forceps. Baudelocque, L'Avt des accouchemens. Tom. II. Paris 1781, p. 35. Mulder a.a.O. page 61. Tab. VII. fig. 18-19. Busch. a.a.O. fig. 329.

(*xii*) Foster's forceps. Ed. Foster, the principles and practice of Midwifery. London. 1781, p. 151.

(*xiii*) Aitken's first forceps. Aitken, Principle of Midwifery. London 1784. d.v. Spohr. 1787. Taf. 17. Mulder a.a.O. page 69. Tab. V. fig. 9. Busch a.a.O. fig. 330. I.

(*xiv*) Aitken's second forceps. Mulder a.a.O. page 71. Tab. V. fig. 10. Busch a.a.O. fig. 330. II.

(*xv*) Aitken's third forceps. Mulder a.a.O. page 71. Tab. V. fig. 11. Busch a.a.O. fig. 330. III.

(*xvi*) Mayer's forceps. J.ch. A. Meyer, resp. D. W. Sachtleben. Animadvers. nonnullae circa usum forcip. Levret. in partu difficili. Traject. ad. Viadr. 1785. c. fig. p. 14. Mulder a.a.O. page 73. Busch a.a.O. fig. 331.

(*xvii*) Stark's forceps. Döbner, Diss, de instrument. applicand. necessitate tempore ac modo justo et optimo in arte obstetricia. Jenae. 1785 c. Tab. Aen. p. 27. Stark's Archiv. Bd. II. Jen. 1789. Mulder a.a.O. p. 74. Tab. VI. fig. 1 u 2. Busch

a.a.O. fig. 332. Archiv fur die Geburtshulfe. Vergl. B. vi. H. 3.

(*xviii*) Lodi's forceps. Baldinger's medicinisches Journal 5. Bd. St. 20. Gott. 1789. S. 32.

(*xix*) Wegelin's forceps. Stark's Archiv. Bd. II. St. 2. S. 88. Busch a.a.O. fig. 333.

(*xx*) Saxtorph's forceps. Acta reg societ. med. Havn. Vol. II. 1791. p. 344. Mulder a.a.O. p. 82. VI. 3 u 4. Busch a.a.O. fig. 334.

(*xxi*) Osborn's forceps. Osborn Essays on the practice of Midwifery. London 1792. Mulder a.a.O. page 82. VI. 5 u 6. Busch a.a.O. fig. 335.

(*xxii*) Thynne's forceps. Mulder a.a.O. page 85. Tab. VI. 9 u 10.

(*xxiii*) L. Boer's forceps. Hussian. Handbuch der Geburtshulfe. 3 Th. Wien 1828. S. 17 d. Vol. Abbild 1 u 2. Kymmel a.a.O. S. 9. Tab. I. 1 u 2. Busch a.a.O. fig. 336.

(*xxiv*) Dubois's first forceps. Mulder a.a.O. page 85. VII. 20-29. Busch a.a.O. fig. 337.

(*xxv*) Santarelli's forceps. Santarelli, Letters intorno ad un nuovo forceps d' obstetricia Wien 1794. fig. 4. Kymmel a.a.O. page 11 Tab. 1 u 3-8. Busch a.a.O. fig. 338.

(*xxvi*) Weisse's forceps. C. G. Stohrer. Diss, de quibusdam paragompheos remedies praesertim de forcipis utilitate, Viteb. 1795. Kymmel a.a.O. page 11. Tab. I. fig. 3-8. Busch a.a.O. fig. 339.

(*xxvii*) Busch's (d. Aelt.) forceps. Stark's Archiv. Bd. VI. St. 3. Busch a.a.O. fig. 340.

(*xxviii*) Wrisberg's forceps. C. G. Hehn. de forcipe obstetr. usu recto et applicat. Gott 1796. Kymmel a.a.O. page 13. Tab. I. fig. 9-10.

(*xxix*) Brunninghausen's forceps. Brunninghausen, Ueber eine neue von ihm erefundene Geburtszange. Wurzb. 1802. Kymmel. a.a.O. p. 19. Tab. II. 9-10. Busch a.a.O. fig. 342.

(*xxx*) V. Siebold's first forceps. A. Lanbreis, Diss. de forcip obstetricae requisitis. Wrisburg. 1802. Busch a.a.O. fig. 343.

(*xxxi*) V. Siebold's second forceps. Kymmel a.a.O. p. 18.

(*xxxii*) de Koning's forceps. J. de Koning, Overzetting van de beschryving van une nieuwe tang van Bruninghausen Leiden 1805 pag. 33. Kymmell a.a.O. pag. 21. Tab. II. 11 u 12.

(*xxxiii*) Mursinna's forceps. Neues Journal for Chirurgie Arzeneikunde und Geburtshulfe. 1 Bd. Berl. 1803. Kymmell a.a.O. p. 22. Tab. II. fig. 1 u 2. Busch a.a.O. fig. 344.

(*xxxiv*) Brunninghausen's second forceps. Brunninghausen Ueber die Exstirpation de Balggeschwulste nebst einem Anhange uber die von ihm verbesserte Geburtszange Wurzb. 1805. Kymmell a.a.O. page 2. Tab. III. 10-11.

(*xxxv*) Colland's forceps. Colland, Fund art obstetric. Wien 1804. Kymmell a.a.O. page 24.

(*xxxvi*) Fries' forceps. v. Siebold's Lucina. Bd. III. 1806 p. 321. Kymmell a.a.O. page 27. Tab. III. 12-15. Busch a.a.O. fig. 345.

(*xxxvii*) Herholdt's forceps. Muller, Philadelphia Journal. Vol. I. 1805. 2. st. 144. 147. Kymmel a.a.O. p. 25. Tab. III. 8 u 9.

(*xxxviii*) Wigand's forceps. Wigand und Gumprecht, Hamb. 1807 S. 76. Kymmell a.a.O. p. 28. Tab. iv. 1 u 2.

(*xxxix*) Joerg's first and second forceps. Joerg. Handbuch der Geburtshulfe. Leipzig 1807. S. 413. II. Auflage Leipzig 1820. S. 404 u 415. III. Auflage 1833. S. 461 u 472. Kymmel a.a.O. p. 29. Tab. iv. 3, 4, u 5. 18-20 Busch a.a.O. 348.

(*xl*) Schmitt's forceps. v. Siebold's Lucina Bd. v. St. 1 u 2 page 61. Kymmel a.a.O. page 31. Tab. iv. 5-7.

(*xli*) Muller's forceps. B. Bell Lehrbegriff der Wundarzneikunde, a.a. Engl. ubers Leipz 1810, S. 390.

Kymmel a.a.O. Tab. iv. 7-11. Busch a.a.O. fig. 349.

(*xlii*) Michaelis' forceps. v. Siebold's Lucina Bd. IV. St. 3. S. 325. Kymmel a.a.O. page 33.

(*xliii*) Senff's first and second forceps. C. F. Senff Ueber die vervollkommung der Geburtshulfe. Halle 1812. S. 131 u 132. Kymmel a.a.O. S. 34. Tab. V. 1, 2. 3,-5.

(*xliv*) Bohm's forceps. A. H. Horre, Diss inaug. recentiesim forcipum obstetric historiam criticam exhibens. Marb. 1815. Kymmell a.a.O. S. 35. Busch a.a.O. fig. 355.

(*xlv*) Markard's forceps. Horre a.a.O. Kymmell a.a.O. p. 35. Busch a.a.O. fig. 356.

(*xlvi*) Flamant's forceps. Dictionnaire des sciences med. Paris 1816. Tome XVI. Art. forceps. Toonsoaint, S. consideratimus generales sur les accouchemens particulierement. sur l'emploi du forceps francais dans la pratique de act art. Strash, 1822. Kymmell a.a.O. p. 36. Tab. V. fig. 6-9. Busch a.a.O. fig. 357.

(*xlvii*) Dubois's forceps. Kymmell a.a.O. p. 36. Tab. II. fig. 4-6.

(*xlviii*) Salomon's forceps. G. Salomon, Handleiding tot de Verloskunde. Amst. 1817. 2 de deel page. 245. Kymmell a.a.O. p. 37. Tab. V. fig. 13 u 14.

(*xlix*) Ritgen's I forceps. Ritgen, Auzeigen der mechanischen Hulfen bei Entbindungen. Leip. 1820. S. 455. Kymmell a.a.O. p. 38. Tab. V. fig. 15-18. Busch a.a.O. fig. 350 I.

(*l*) Carus's forceps. Carus Gynaekologie Bd. II. S. 640. Kymmell a.a.O. p. 40. Tab. VI. fig. 1 u 2. Busch a.a.O. fig. 358.

(*li*) Horn's forceps. Horn's theoretisch praktisches Lehr. buch der Geburtshulfe. Wien 1825. Kymmell a.a.O. p. 42. Tab. VII. fig. 3 u 4. Busch a.a.O. fig. 351.

(*lii*) Godman's forceps. Froriep's Notizen 1826. Bd. XIV. Nr. 289. S. 48. Kymmel a.a.O. p. 43.

(*liii*) Niemeyer's forceps. E. Meyer, Geburtshulfliche Beobachtungen und Ergebnisse. Bremen 1838. S. 165.

(*liv*) Maygrier's forceps. Maygrier, Nouvelles demonstr. etc. Pl. I. XXIII. page 73. Kymmell a.a.O. p. 43. Tab. IV. fig. 5-7. Busch a.a.O. fig. 360.

(*lv*) Mende's first and second forceps. Gemeinsame deutoche Zeitschrift fur Geburtskunde Bd. III. 1828. S. 274 Kymmell a.a.O. p. 44 u 46. Tab. VI. fig. 8 u 9. Busch a.a.O. fig. 352.

(*lvi*) Naegele's forceps. Conquest, Grundriss der Geburtshulfe deutsch von S. J. Otterburg. Heidelb. u. Leipz 1834 Tab. XIV. fig. 1. Kymmell a.a.O. p. 48. Tab. VII. 7 u 8. Busch a.a.o. fig. 362.

(*lvii*) Kilian's forceps. Kymmell a.a.o. p. 49. Tab. VII. fig. 9 u 10.

(*lviii*) D'Outrepont's forceps. Kymmell a.a.o. p. 751. Tab. VII. 15 u 16.

(*lix*) Huter's forceps. Busch a.a.o. fig. 364.

(*lx*) Bernard's forceps. Gazette des Hopitaux 1840. Leud. 13 Fev. Froriep's neue Notizen 1837 Sept. Nr. XIX B. 3 S. 302. Kymmell a.a.O. p. 52.

(*lxi*) Guillon's forceps. Maygrier. a.a.o. Kymmell a.a.o. p. 54. Tab. VII. 1 and 2. Busch a.a.O. fig. 361.

(*lxii*) Busch's d.J. first and second forceps. Siehe Busch's Lehrbuch der Geburskunde. 4 Aufl. 1842. S. 482. Atlas geburtshulflicher Abbildungen. Berlin, 1841 S. 103. Tab. XXXVII. 149 u 150. Busch a.a.o. fig. 359, a u b.

The following forceps have also been described upto the present day. Meyrieu, Colombat, Schweig-hauser, Prout, Brulatour. and Capuron. (Kymmell a.a.o. S. 55). Audibert (Memoire sur un forceps indicateur etc. Paris 1833), Velpeau (Traite complet de l'art des accouchemens Bruxelles, 1835. Tab. 2. page 417. Kymmell a.a.o. p. 57 Tab. VII. 8 u 9). Radford (Velpeau a.a.o. p. 417, Kymmell a.a.o. p. 57), Hatin

(J. Hatin Cours complet d' accouchemens, Paris 1832 page 182; Kymmell a.a.o. p. 58 Tab. VIII. fig. 3 u 4); Baudelocque J. (Kymmell a.a.o. p. 59 Tab. VIII. fig. 5, 6 u 7), Hopkins (Kymmell a.a.o. p. 59 Tab. VIII. fig. 10 u 11). Erpenbeck (Neue Zeitschrift fur Geburtskunde. Berlin 1834. Bd. 1. 3 Thl. S. 7. Kymmell a.a.o. p. 61. Tab. VIII. 12-15). Duges (Kymmell a.a.o. p. 68 Tab. VII. fig. 5 u 6).

(*b*) Blades of unequal length.

(*i*) Davis II and III forceps. Davis Elements of Operative Midwifery, London 1825. Kymmell a.a.o. p. 63. Tab. VI. fig. 11-14. Busch a.a.o. fig. 380.

(*ii*) Ritgen's forceps. Gemeinoame deutsche Zeitschrift fur Geburtskunde IV Bd. Heft. 3. S. 401. Kymmell a.a.o. S. 66. Tab. VIII. fig. 11-14. Busch a.a.o. fig. 350.

(*iii*) Huter's forceps. Busch a.a.o. fig. 364.

(*iv*) Duges's forceps, (with revolving blades). Revue medicale 1835, Inil S. 63. Wochentliches Repertorium. der neuesten med. churnrg. Litt. des Anslandes. 1836. Nro. 5. S. 81. Kymmell a.a.o. p. 68. Tab. VIII. fig. 18.

(*c*) Blades not crossed.

(*i*) Coutouly's second forceps. G. Mithof, Diss. sist. comparat. inter versiones negotium et operat. instrument. Gott. 1788, Mulder a.a.o. S. 77. Tab. X. fig. 3 u 5. Busch a.a.o. fig. 365.

(*ii*) Thenance's forceps. Thenance, Nouvean forceps non croise ou forceps du celebre Levret perfect. en 1781. Lyon An X. Lucina Bd. I. S. 66. Kymmell a.a.o. p. 70 Tab. III. fig. 3-5.

(*iii*) Delpech and Lacroix's forceps. Delpech. Annales de la societe de med. pratique de Montpellier, Tom. V. 8 page. 366. Mamorial des Hopitaux du Midi et de la clinique de Montpellier. Nov. 1829 p. 588. Busch a.a.o. fig. 366.

(*iv*) Weiss's forceps. Weiss Catalogue of chirurgical instruments. London 1825 p. 105 and Weiss. An account of inventions and improvements in Surg.

instruments etc. London 1831 page. 95. Plat 20. Kymmell a.a.o. p. 72.

(2) Blades not fenestrated.

(*a*) Blades crossed.

(*i*) Osiander's first and second forceps. Osiander's Denkwurdigkeiten etc. Bd. I. Gott. 1799. S. 282. Kymmell a.a.o. p. 73 u 74. Tab. I. fig. 15 u 16. Busch a.a.o. fig. 367.

(*ii*) Weissbrod's forceps. Textor's neuer Chiron. 2. B. 1 Hft. Sulzbach 1825. S. 87. Kymmell a.a.o. p. 75. Tab. VI. 3 u 4. Busch a.a.o. fig. 369.

(*b*) Blades not crossed.

(*i*) Assalini's forceps. P. Assalini, Nuovi stromenti di obstetricia e loco usu Milan 1810. p. 25. und Bulletin des Sciences med. redige par Tartra Tom. 6. Paris p. 57. Kymmell a.a.o. p. 77. Tab. IV. fig. 15 u 16. Busch a.a.o. fig. 368.

(*ii*) Feiler's forceps.

(*iii*) Montaine's forceps. Journal de med. chir pharm. etc. par Leroux. April 1817 Tome 38. Paris p. 365. Kymmell a.a.o. p. 79.

III. Forceps with Cephalic, Pelvic and Perineal Curves.

(*a*) Blades crossed.

(*i*) Johnson's second forceps. Johnson et new system of Midwifery etc. London. 1769. p. 173 u III. zu page 268. Gehler de forcipis Johnsonianae prae Levretiana et Smelliana praestantia. Leipzig. 1790. Mulder a.a.o. p. 60. Tab. IV. fig. 3 u 4. Busch a.a.o fig. 370.

(*ii*) Van de Laar's forceps. Van de Laar Schats der geheele Verlost etc. Gravent 1777. Mulder a.a.o. p. 58. Tab. IV. fig. 10 u 11 and Tab. VI. fig. 11 u 12. Busch a.a.o. fig. 371.

(*iii*) Sleur's forceps. Vroed merktnig kundige proefueningen waar door de Hefboom verbeteerd. Utrecht 1783. Mulder a.a.o. S. 63. Tab. IV. fig. 12 u 13. Busch a.a.o. fig. 372.

(*iv*) Young's forceps. Smellie, anatomical tables etc. new edit. by Hamilton Edin. 1787. Fol. addit table Nr. 40. fig. 1. Mulder a.a.o. p. 68. Tab. V. fig. 5 u 6. Busch a.a.o. fig. 373.

(*v*) Evan's forceps. Mulder a.a.o. p. 68. Tab. V. fig. 7 u 8. Busch a.a.o. fig. 374.

(*vi*) Mulder's forceps. Mulder a.a.o. p. 207. Tab. XI. fig. 11 u 12 Klees Bemerkungen uber eine neue Geburtszange. Frankf. a. M. 1794. Busch a.a.o. fig. 375.

(*vii*) Henkel's forceps. Stark's Archiv. Bd. III. S. 562. Kymmell a.ao. p. 81. Tab. VIII. fig. 15 u 20.

(*viii*) v. Eckardt's forceps. Topp. Diss. sistens forcip obstetr. nuperrime inventae descriptonem Jen, 1800. Kymmell a.a.o. p. 82. Tab. 11 fig. 1 u 2. Busch a.a.o. fig. 376.

(*ix*) v. Froriep's forceps. v. Siebolds Lucina Bd. II. St. I. S. 1. Kymmell a.a.o. p. 83. Tab. 11 fig. 7 u 8. Busch a.a.o. fig. 378.

(*x*) Schmidtmuller's forceps. J. A. Schmidtmullers Lehrbuch der Geburtshulfe 1 stes Bandchen Erlangen 1807 St. I.S. 100, Kymmell a.a.o. p. 84.

(*xi*) Veit Karl's forceps. G. v. Eckardt d.j. in seinem Magazin fur die technische Heilkunde-Ullm. 1805. S. 113. Veit Karl eine neue Geburtszange erfunden und der Prufung des Sachverstandigen vorgelegt. Frankf. a.M. 1811. v. Siebold's Journal Bd. I. St. 3. S. 491. Kymmell a.a.o. p. 85. Tab. IV. fig. 12-14.

(*xii*) Hamilton's forceps. Kymmell a.a.o. p. 87. Tab. V. fig. 10-11.

(*xiii*) Campbell's forceps. W. Campbell. Introduction to the study and practice of Midwifery. Edin. 1833. S. 233. Kymmell a.a.o. p. 88. Tab. VIII. fig. 16 u 17.

(*xiv*) Davis's I forceps. Davis a.a.o. Kymmell a.a.o. p. 89. Tab. VII. fig. 17 u 18. Busch a.a.o. fig. 381.

(*xv*) Conquest's forceps. London Medical Repository Nr. 75. March 1820. fol. XIII. S. 185. Conquest's

Geburtshulfe ubersetzt. von Otterburg. Heidelb. u Leipzig. 1835. Kymmell a.a.o. p. 96. Tab. V. fig. 21 u 22. Busch a.a.o. fig. 379.

(*b*) Blades not crossed.

Uhthoff's forceps. S. J. G. H. Uhthoff, cephaloductor oder Versuch eines neuen Ent-bindungs instrumentes u.s.w. Hannover 1812. Kymmell a.a.o. p. 90. Tab. IV. 17-22. Busch a.a.o. fig. 381.

IV. Forceps with Cephalic and Perineal Curves.

Kymmell contains the forceps of Orme, Lowder, Denman, Conquest, Haighton and Blundell. We have however already described them in their proper place. The forceps of Blundell is described and depicted in Kymmell (a.a.o. p. 99 Tab. VIII. fig. 1 u 2).

TABLE B.

From Froriep's Handbuch der Geburtshulfe.—Weimer 1822, p. 433.

(1) Forceps with Cephalic Curve only.

Blades non-fenestrated.		Blades fenestrated.	
Non-crossed.	Crossed.	Non-crossed.	Crossed.
Palfyn (1720)	Unknown	J. Mesnard (1741)	Giffard (1734)
G. le Doux	Dusee (1733)		Drinkwater
Heister	Bing (1750)		Freke
P. de Wind			Ould
Burton (1751)			Chapman
			Unknown (1736) (with so-called English lock).
			Levret (1747) (a' l'axe ambulant).
			Smellie (1751)
			Orme
			Lowder
			Pole
			Denman
			Rawlins
			Clarke
			Haighton
			Walsh
			Conquest.

(2) Forceps with Cephalic and Pelvic Curve.

Blades fenestrated.

Crossed.

Levret (1751 and 1767).
Smellie (1752).
Pugh
Lauverjat
Fried d. J.
Leake (1774)
Piet
Petit
Coutouly
Pean u. Baudelocque.
Aitken
Mayer
Starke
G. Lodi
Foster
Wegelin
Saxtorph
Osborn
Boer
Denman
Thynne
Dubois
Santarelli

Non-crossed.

Thenance (1802).

Busch
Weisse
Wrisberg
Weise
Mursinna
Brüninghausen
v. Siebold
Wigand
Delpech
Veit-Karl
Herholdt
Fries
Markard
Muller
Colland
Ritgen
Boehm
Michaelis
Senf.

Blades non-fenestrated.

Osiander (1799).
Assalini
Feiler.

(3) Forceps with Cephalic, Pelvic and Perineal Curve.

Crossed.

Johnson (1769)
van de Laar
Sleurs
Young
Evans
Mulder
v. Eckard
v. Froriep (1801)
Schmidmuller.

Non-crossed.

Uhthoff. (1812).

TABLE C.

From Kilian's Operative Geburtshulfe, 1849.

I. Forcephs provided with only a Cephalic Curve.

(1) Blade without fenestration.

(*a*) Arms not crossed.

Palfyn, Gilles le Douz, Heister, Schlichting, Rathlauw I, Burton, Paul de Wind.

(*b*) Arms crossed.

Unknown, Dusee Bing.

(2) Blade with fenestration.

(*a*) Arms not crossed.

Mesnard.

(*b*) Arms crossed.

Giffard, Drinkwater, Freke, Chapman, Unknown, Ould, Gregoire, Levret (a axe ambulant), Smellie I, Rathlauw II, Pole, Orme, Lowder, Denman, Savigny, Johnson I, Rawlins, Holme, Leaderer, Casanova.

II. Forceps with Cephalic and Pelvic Curve.

(1) Blade without fenestration.

(*a*) Arms not crossed.

Assalini, Feiler, Montain.

(*b*) Arms Crossed.

Osiander, Weissbrod.

(2) Blade with fenestration.

(*a*) Arm not crossed.

Coutouly II. Thenance, Weiss.

(*b*) Arms crossed.

Levret II and III, Smellie II, Pugh, Fried I and II, Leake, Plenk, Petit, Coutouly I, Pean, Aitken I, II and III, Mayer, Stark, Foster, Lodi, Wegelin, Boer, Santarelli, Weisse, Wrisberg, J. D. Busch I and II, Mursinna, Brunninghausen, de Koning, El. v. Siebold I and II, Collard, Herholdt, Fries,

Wigand, Jorg, I and II, Lauverjat, W. Schmitt, Muller, Michaelis, Senff I and II, Bohm, Marcard, Flamant, Salomon, Ritgen I, Carus, Horn, Godman Niemeyer, Maygrier, Mende, D. W. H. Busch, Naegele, Kilian, d'Outrepont, Huter, Guillon, Meryeu, Colombat, Schweighauser, Prout, Brulatour, Capuron, Audibert, Duges, Velpeau, Radford, Hopkins, Hatin, Baudelocque d.N., Erpenbeck.

(*c*) Arms with unsymmetrical length and breadth.

Davis II and III, Ritgen, Duges (a cuillers tournantes).

(*d*) Arms indissolubly united.

Camille Bernard (forceps assemble)—Tureau (forceps destine a faire eviter le manoeuvre du decroissement).

III. Forceps with Cephalic, Pelvic and Perineal Curves.

Blade with fenestration.

(*a*) Arms not crossed.

Uhthoff, Delpech.

(*b*) Arms crossed.

Pugh (?) Johnson, van de Laar, Sleurs, Young, Evans, Mulder Henckel, v. Eckardt, v. Froriep, Schmidtmuller Veit Karl, Hamilton, Campbell, D. Davis I.

IV. Forceps with Cephalic and Perineal Curve.

Blade with fenestration.

Arms Crossed. Orme, Lowder, Denman, Conquest, Haighton, Blundell.

TABLE D.

From Busch's Lehrbuch der Geburtskunde. Berlin, 1849.

I. Forceps with only Cephalic Curve.

(1) Blades without fenestration.

(*a*) Not crossed.—Palfyn (1723) Gilles le Doux, Heister, Burton, Schlichting (1747), Peter de Wind (1752).
(*b*) Crossed.—Unknown, Dusee (1733), Bing.

(2) Blades with fenestration.

(*a*) Not crossed.—Mesnard (1741).
(*b*) Crossed.—Giffard (1734), Drinkwater, Chapman, Freke, Ould, Unknown, Levret (1747), a l'axe ambulant, Boehmer, Gregoire, Smellie, Pole, Clarke, Rathlauw, Walsh, Orme, Lowder, Denman, Rawlins, Haighton, Holme (1828).

II. Forceps with Cephalic and Pelvic Curve.

(1) Blades with fenestration.

(*a*) Crossed.—Levret (1751 and 1767), Smellie (1752) Pugh, Lauverjat, Fried d.j., Leake, Piet, Petit, Coutouly, Pean and Bandelocque, Meyer, Aitken, Stark, Lodi, Foster, Forster, Wegelin, Saxtorph, Boer, Osborn, Denman, Thynne, Dubois, Santarelli, Busch Sen, Weisse, Wrisberg, Mursinna, Brunninghausen, v. Siebold, Wigand, Delpech, Veit Carl, Herhold, Fries, Markard, Mueller, W. Schmitt, Boehm, Colland. Miechaelis, Senff. Busch jun. Ritgen, Mende, Jorg, Carus, Naegele, d'Outerpont, Flammant, Maygrier, Godman, Guillon, Horn, Huter.
(*b*) Blades of unequal length.—Davis (1825). Ritgen.
(*c*) Not crossed.—Thenance (1802). Seubert (1846).

(2) Blades without fenestration. Osiander, Assalini, Feiler, Weissbrod.

III. FORCEPS WITH CEPHALIC, PELVIC AND PERINEAL CURVES WITH FENESTRATED BLADES.

(*a*) Crossed.—Johnson (1769), Van de Laar, Sleurs, Young. Evans, Mulder, v. Eckard, v. Froriep, Schmidt-muller, Conquest, Davis, (1825) Hermann (1845).

(*b*) Not crossed.—Uhthoff.

SECTION X.

CHRONOLOGICAL TABLES OF FORCEPS.

I. From Mulder's Historia. 1794 (Schlegel's translation, 1798).

1.	Avicenna	1000	23.	Levret	1767
2.	Ruyff	1554	24.	Johnson	1769
3.	Chamberlin	1672	25.	Fried	1770, 1771, 1772
4.	Drinkwater	1668	26.	Leake	1774
5.	Solingen	1673	27.	Petit	1774
6.	Slevogt	1709	28.	van de Laar	1777
7.	Palfyn	1720	29.	Coutouly	1777
8.	Dusee	1733	30.	Pean	1781
9.	Giffard and Freke	1734	31.	Sleurs	1783
10.	Chapmann	1735	32.	Orme and Lowder	1783
11.	Chapman (without lock)	1736	33.	Young	1784
12.	Mesnard	1741	34.	Evans	1784
13.	Gregoire	1746	35.	Aitken	1784
14.	Rathlaw	1747	36.	Mayer	1785
15.	Schlichting	1747	37.	Starke	1785
16.	Levret	1747	38.	Coutouly	1788
17.	Bing	1750	39.	Saxtorph	1791
18.	Levret	1751	40.	Osborn	1792
19.	Burton	1751	41.	Unknown	
20.	de Wind	1752	42.	Denman	
21.	Smellie	1752	43.	Thynne	
22.	Pugh	1754	44	Dubois	

The following are added by the translator Schlegel.

Ciaccius (Phillip)	Lodi
Mawbray (Johann)	Santarelli
Gregoire (Junior)	Busch
Ould (Fielding)	Weisse
Piet	Wrisberg
Mittelhauser	Boer
Forster	Osiander
Rawlins	

II. From Dr. D. W. H. Busch and Dr. A. Moser's Handbuch der Geburtskunde, 1843.

1723.	Palfyn	1736.	Unknown
——	Gilles Doux	1739.	Heister
1725.	Drinkwater	1741-43.	Mesnard
1733.	Dusee	1742.	Ould
1734.	Giffard	1746.	Gregoire d. j.
——	Freake	1747.	Rathlaw
1735.	Chapman	——	Schlichting

1747.	Levret
1750.	Bing
1751.	Levret (with pelvic curve)
——	Burton
——	Paul de Wind
1752.	Smellie
1754.	Pugh
1760.	Levret (with revolving axis).
1769.	Johnson
1770.	G. A. Fried
1773.	Leake
1774.	Petit
1776.	Henckel
1777.	van de Laar
——	Coutouly
1779(?).	Piet
1781.	Pean-Baudelocque
——	E. Foster
——	Thenance
1783.	Sleurs
——	Orme
——	Lowder
1784.	Evans
——	Aitken
1785.	J. Chr. A. Mayer
——	Stark
1787.	Young
1788.	Coutouly
	Foster
1789.	Wegelin
——	G. Lodi
——	Pole
1791.	Saxtorph
1792.	Osborn
1793.	Denman
——	Thynne
——	Rawlins
——	Boer
——	Dubois
1794.	Mulder
——	Santarelli
1795.	Weisse
1796.	Busch d. a.
——	Wrisberg
1799.	Osiander
1800.	V. Eckardt.
1802.	Brunninghausen
——	El. v. Siebold
——	Thenance
1803.	Mursinna
——	Koning
1804.	V. Froriep
——	F. Colland
1805.	Delpech
——	Lacroix
——	Veit Carl

1805.	Herhold
1806.	Fries
1807.	Wigand
——	Jorg
——	Schmidtmuller
——	Th. St. Lauverjat
1809.	W. Schmidt
——	Osiander
1810.	Fr. A. Müller
1811.	Assalini
——	G. Ph. Michaelis
——	Veit Carl
1812.	Uhthoff
——	Senff
1815.	Bohm
——	Marcard
1816.	Flamant
1817.	Montain d. j.
——	Salomon
——	A. Hamilton
——	Dubois
1820.	Carus
——	Ritgen
——	Conquest
——	Joerg
1824.	Haighton
1825.	Weissbrod
——	Davis
——	J. Weiss
1826.	J. Ph. Horn
——	Godman
1827.	Maygrier
——	Guillon
——	Lederer
1828.	Mende
——	Holme
——	Naegele
1829.	Brulatour
——	Capuron
——	Prout
——	Colombat
——	Killian
1830.	Busch d. j.
——	d'Outrepont
——	Camille Bernard
1831.	Blundell
1833.	Duges
——	Audibert
——	Casanova
——	W. Campbell
——	Guillon
——	Meryeu
——	Colombat
——	Schweighauser
——	Prout
——	Capuron
——	Velpeau

1833.	Radford	1834.	Naegele
——	Hatin	——	Erpenbeck
——	Baudelocque Jun.	1837.	Huter
——	Hopkins	1838.	Niemeyer

III. From Dr. Hermann Friedrich Kilian's Operative Geburtshulfe 1849.

Joh Palfyn (1723).
Drinkwater (1668. 1728).
Gilles le Doux (1723 ?).
Ch. Dusee (1733).
Will. Giffard (1734).
Freke (1734).
Edm. Chapman (1735).
Zange eines Unbekannten mit dem sog. englischen Schlosse (1736).
L. Heister (1739).
Jacques Mesnard (1741).
Fielding Ould. (1742).
Gregoire D. J. (1746).
Jo. P. Rathlauw (1747).
Jo. Dan. Schlichting (1747).
Andr. Levret (1747 1751. 1767).
L. Bing (1750).
John Burton (1751).
P. de Wind (1752).
W. Smellie (1752).
Benj. Pugh (1754).
Rob. Wall. Johnson (1769).
Ge. Alb. Fried (1770. 1771. 1772).
Piet (1771).
John Leake (1773).
J. Louis Petit (1774).
Henckel (1776).
Arn. van de Laar (1777).
Coutouly (1777. 1788).
Pean und Baudelocque (1781).
P. W. Sleurs (1783).
Dav. Orme (1783).
Will. Lowder (1783).
Th. Young (1784).
John Evans (1784).
John Aitken (1784).
J. Chr. A. Mayer (1785).
Jo. Chrst Stark (1785).
Gaetano Lodi-Ed. Foster (1787).
Pole (1789). In Savigny's Collection, etc., Pl. XXXVII, fig. 1. 2
Wegelin (1789). In Stark's Archiv Bd. II. Stck. 2, p. 88 seq.
Matth. Saxtorph (1791).
Will. Osborn (1792).
Th. Denman (1793).
L. J. Boer (1793).
Thynne—Ant. Dubois—R. Rawlins (1793).
Chio. Gerem. Santarelli (1794).
Joh. Mulder (1794).
Weisse (1795).
J. D. Busch (1796).
H. A. Wrisberg (1796).

Fr. B. Osiander (1797, 1809). Bis hierher sind die najeren Nachweisungen uber die genannten Zangen in Mulder's klassischem und allbekanntem Werke nachzuschlagen.
Von Eckardt (1800).—Beschrieben und abged, in der Diss. v. E. A. Topp; auch in der Diss. v. Baur (I. c. p. 19 seq. Tab. I. fig. 2).
L. v. Froriep (1802). Ej. In v. Siebold's Lucina, Bd. II. Stck 1, p. 1—7. Vergl-auch Ej. Handb., etc. Ed. 1802.
Ch. L. Mursinna (1803). Ej. Neues Journal, etc., 1. c. p. 135.
H. J. Brunninghausen (1802, 1805). Beschrieben und abgebildet in zwei eigenen Schriften 1. 1. c. c.
El. v. Siebold (1802). Beschrieben in d. Dissert. von Laubreis (I.c.) und Lucina, Bd. I. Stck 2, p. 206.
J. Sim. Thenance (1802). Beschrieben in einer eigenen Schrift I. c.
Jzaak de Koning (1803). Ej. Overzetting van de beschrijving van eene nieuwe tang van Bruninghausen. Leiden, 1803. 8., p. 33 seq. Abgebild. in d. Diss. v. Kymmel T. II. fig. 11, 12.
Delpech (1805). In den Annales de la Societe de Med. prat. de Montpellier, T. V. An. XIII, p. 366.
Fr. Colland (1804). In Ej. Fundam. artis obstetr. Vienn. 1804, p. 185.
J. H. Wigand (1807). Im Hamburg. Magazin I. c

G. v. Erhart (1805). Ej. Magazin fur die technische Heilkun de I. c.
Fries (1806). In der Lucina I. c. p. 321 seq.
Hernoldt. Im Philadelphia Journal. 1825. Vol. 1. I. Part II, p. 144, 147. Beschrieben von Fr. Detl. Meyer.
Schmidtmuller (1807). In Ej. Jahrbuch der Geburtshulfe, etc., Bd. I., p. 1. seq.
W. Schmitt (1809). Die Zange ist sehr bekannt und ganz vortrefflich, doch giebt es keine ausfuhrl. Beschreibung von ihr. Das Exemplar, mit welchem Schmitt viele Jahre operirte besitzt Naegele als ein theures Vermachtniss.
Fr. A. Muller (1810). In Bell's Lehrbegriff der Wundarzneikunst, etc., I. c.
F. E. Lauverjat. In G. W. Stein d. J. Annalen, etc., 1808. Stck 1., p. 29.
Veit Karl (1805, 1811). Zuerst von Ehrhart d. J. in Ej. Magaz. fur die techn. Heilk, etc. Ulm 1805. 8. p. 113 erwahnt, dann beschrieben in einer eigenen Schrift I. c.
P. Assalini (1810, 1811). In Ej. Nuovi Stromenti, etc., p. 25. Tav. I. fig. 1. 2. 3.
G. Ph. Michaelis (1811). In Siebold's Lucina, Bd. VI. Stck. 3. p. 325. Kurz angedeutet.
J. G. H. Uhthoff (1812). Beschrieben in einer eigenen Schrift I. c.
C. F. Senff (1812). Ej. Ueber die Vervollkommnung der Geburtshulfe von Seiten des Staates, etc., Halle, 1812, m. Kpf. p. 131 seq.
G. L. Boehm (1815). Horrel. c. p. 30.
H. Matth. Marcard—Horrel. c. p. 34 seq.
R. P. Flamant (1816). Ej. Memoire pratique sur le forceps, etc., p. 23 seq. p. 30. und die beigefugte Abbildung.
J. F. Schweighauser. Vergl. Rist's Essai hist., et. crit sur le forceps. Strasb. 1818. 4.
Montain d. J. (1817). Im Journal de Medecine, Chirurgie et Pharm. T. XXXVIII Avril, 1871. p. 356.
F. A. Ritgen (1820. 1825). Ej. Anzeigen, etc., I. c. Vergl. auch gem. Zeitschr. f. Gebtsk. Bd. IV. Stck. 3. p. 401. *Ibid.* Bd. V. Stck. 1 p. 107 seq.
Jorg (1807. 1820). In Ej. systemat. Handbuch, etc., 1807. p. 306 seq. 340. *Ibid.* recht gut abgebildet.
J. T. Conquest (1820). Ej. Outlines of Midwifery, etc. p. 122.
Weissbrod (1821). In Textor's neuem Chiron Bd. II. Stock. 1 (1825) p. 87 seq.
J. P. Maygrier (1822). Ej. Nouvelles Demonstrations, etc., 1822. fol. pl. LXXIII.
L. Mende (1824, 1828). Vergl. gemeins. Zeitschr. f. Geburtsk. I. c.
D. D. Davis (1825). In Ej. Elements of operative Midwifery, etc., und in den Froriep—schen geburtshulflichen Demonastrationen, etc., Tab. XVII. fig. 1—5. XVIII. 1—10 XIX. fig. 1—9.
Horn (1826). In Ej. Bemerkungen und Erfahrungen aus der praktischen Geburtshulfe, etc., p. 73 seq. mit Abildd.
Lederer (?). Es ist eine gerade Zange, die wir selbst wohl kennen, deren Beschreibung aber noch fehlt.
Godman (1826). Lebt in Philadelpia. Vergl. Froriep's Notizen, etc., 1826. No. 289. p. 48.
E. Holme (1828). Froriep's Notizen, etc., Bd. XXI. No. 456. p. 256.
Naegele. Naegele's Zange, mit Recht hochgepriesen von seinen Schulern, ist, so viel wir wissen, nirgends beschrieben—Abgebildet aber in Otterburg's Uebers. v. Conquest, Grunde. d. Gebtsh. Taf. XIV. 1.

Kilian. Die Abbildung unserer Zange befindet sich in unserem geburtshulflichen Atlas.
Alph. Velpeau (1829). In Ej. Traite element. de l'Art des Accouch. T. II. Paris, 1829. 8. p. 760. 1052.
D. W H. Busch (1830). In Heinrich's Dissert (I. c.) beschrieben und abgebildet.
Colombat (1829). In Ferussac's Bullet. I. c.
Jules Hatin (1832). Ej. Course compl. d'Accouchemens, etc. Paris, 1832, 8. p. 182.
Duges (1833). Nouveau forceps a cuillers tournantes. In Froriep's Notizen No. 847. p. 176. (Ej. Memoire sur un nouveau forceps a cuillers tournantes et de son emploi. Paris 1833, 8 av. pl.).
Audibert (Forceps indicateur). *Ibid.* No. 774. p. 64.
Casanova (1833. Elastische Zange von Fischbein). In d. Transact. of the med. and Physical Society of Calcutta. Vol. VI. No. 18. p. 489 seq.
Camille Bernard (1837. forceps assemble). Vergl. Froriep's neue Notizen, etc., 1837. Sept. No. XIX. p. 302.
Radford (1835). Vergl. Velpeau's Traite compl. de l'Art des Accouch Brux. 1835. 8 p. 417.
A. C. Baudelocque jr. Vergl. Diss. v. Lunsingh Kymmel p. 39. 40. Tab. VIII. fig. 5. 6. 7.
Heinr. Erpenbeck (1834). Neue Zeitschr. f. Gebtsk. Bd. I. Heft 3. p. 7. Mit Abbild.
Herm. Niemeyer. In Dr. Ed. Meier's Geburtsh. Beob. u. Ergebn Bremen 1838. 8. m Abbild. p. 165 seq.
C. C. Huter. Seine von uns cit. Schrift.
Tureaud (1843). Nouveau forceps destine a faire eviter le manoeuvre du decroissement--In d. Gazette med. 2 Sepsure 1843. No. 35. p. 560. 61.—Die Zange von Tureaud (de la Nouvelle-Orleans) sucht Dr. Tarsitani in Neapel zu verlassen und giebt eine neu erfundene forceps der Acad. u. Med. in Paris an. Der Berichterstatter Capuron lehrt sie. (Bullet. de l'Acad, Roy. de Med. T. IX. 15. Juni 1844. p. 757. seq.
Brulatour. Merveu, Capuron, Guillon, Prout. Die durftigsten Nachrichten uber diese franzosischen neuen Zangen findet man in Velpeau, L'Art des Accouchemens, T. II. p. 759. Die zusammengesetzteste dieser Zangen ist, so viel wir ersehen, jene von Guillon.
J H. Chrstph. Treffurt (1844). Ej. Abhandl. u. Erfahr. a. d. Geb. d. Geburtsh. Gott. 1844. p. 141 seq.
Idstrom. Er. ist Geburtshelfer in Stockholm und seine Zange soll unter den schwedischen die vorzuglichste sein.
Th. Hermann. Ej. Eine neue Geburtszange zur Extraction des in Beckeneingange stehenden Kindskopfes. Bern, 1844. 4 m. Kpf.

IV. Compiled by the author

1601(?)	Chamberlen	1734	Giffard
1668	Drinkwater		Freke
1673	Solingen	1736	Walker (unknown of Mulder)
1709	Slevogt		
1720	Palfyn	1739	Heister
1721	Ciaccius	1741	Mesnard
1723	Gilles Doux	1742	Ould
1730(?)	Mawbray	1746	Gregoire
1733	Dusee	1747	Rathlaw
——	Chapman	——	Schlichting

1747	Levret (also 1751 and 1760)
1750	Bing
1751	de Wind
——	Burton
1752	Smellie
1754	Pugh
——	Mittelhauser
1767	Stein
1769	Johnson
1770	Fried (also 1771 and 1772)
1771	Piet
1774	Leake
1774	Petit
1776	Henckel
1777	Coutouly
——	Laar
1781	Foster
——	Pean Baudelocque
——	Thenance
1782	Lowder
——	Orme
1783	Sleurs
1784	Young
——	Evans
——	Aitken
1785	Mayer
——	Stark
1788	Coutouly
1789	Lodi
——	Pole
——	Wegelin
1790	Haighton
1791	Boer
——	Saxtorph
——	Dubois
1792	Denman
——	Thynne
——	Osborn
1793	Hamilton
——	Rawlins
1794	Mulder
——	Santarelli
——	Klees
1795	Weisse
1796	Wrisberg
——	Busch
1799	Osiander
1800	Eckardt
1800	Mursinna
1802	Brunninghausen
1803	Koning
1804	Siebold
——	Herboldt
——	Colland
1805	Froriep
——	Delpech-Lacroix
——	Erhart
1805	Uytterhoven
1806	Fries
1807	Jorg
——	Lauverjat
1810	Muller
1811	Assalini
——	Michaelis
1812	James
——	Karl, V.
——	Senff
——	Uhthoff
——	Wigand
1815	Boehm
——	Marcard
1816	Flamant
1817	Brulator
——	Hamilton
——	Montain
——	Salomon
1820	Carus
——	Conquest
——	Joerg
——	Ritgen
——(?)	Stein, jun.
1825	Davis
——	Guillon
——	Maygrier
——	Radford
——	Weiss, J.
——	Weissbrod
1826	Godman
——	Horn
1827	Lederer
1828	Holme
——	Mende
——	Naegele
1829	Capuron
——	Colombat
——	Prout
1830	D. J. Busch
——(?)	Collins
——	Outrepont
1831	Blundell
——(?)	Waller
1833	Audebert
——	Casanova
——	Duges
——	Baudelocque (jun)
——	Hodge
——	Campbell
——	Hatin
——	Hopkins
——	Meryeu
——	Prout
——	Schweighauser
——	Velpeau
1834	Erpenbeck

1834	Ramsbotham
1835	Cazeaux
——(?)	Krassovsky
1836	Bernard
——	Boens
——(?)	Moreau
1838	Niemayer
1839	Greenhalgh
——	Huter
——	Martin
——	Stoltz
1840(?)	Churchill
——	Herman
——	Levy
——	Lovati
——(?)	Rigby
1842	Beatty
——	Kilian
1843	Talatani
——	Tarsitani
——	Thureaux
1844	Idstrom
——	Trefurt
1846	Bedford
1847	Harris
——	Seubert
1848	Bourdeaux
——	Simpson
——	White
1849	Baumers
1850	Bond
——(?)	Clarke
——	Dubois, P.
——	Jouet
——(?)	Hohl
——(?)	Zeigler
1853	Bethell
——	Mattei
——	Naegele
——	Sauve de la Rochelle
1855(?)	Bird
——(?)	Campbell
——(?)	Cederschjold
——(?)	Hagenburger
——(?)	Lever
——	Mattei
——(?)	Nivet
——(?)	Oldham
——	Scholler
——(?)	Walter
1856	Kilian
1857	Vallette
1858	Elliott
1860(?)	Charriere
——(?)	Comstock
——(?)	Depaul
——(?)	Duncan
1860(?)	Giles
——(?)	Hardon
——(?)	Harper
——(?)	Hennig
——(?)	Hoffman
——(?)	Hubert (pere)
——(?)	Japonis
——	Knight
——	Kristeller
——(?)	Meadows
——(?)	Murphy
——(?)	Pagan
——(?)	Schrœder
——(?)	Spiegelberg
——(?)	Young
1861	Chassasgny
——	Hewitt
1862	Cappie
——(?)	Neugebauer
1863	Rizzoli
——	Gayton
1864(?)	Faye
——	Hamon
——(?)	Mondotte
——(?)	Pros
——	Rouche
——(?)	Barnes
1865(?)	Wallace
1866	Dyce
——	Inglis
——	Lazarewich
——	Pajot
——	Sheraton
——	Steele
1867	Buzzel
——	Hamon
——	Joulin
——	Niles
1868	Aveling
——(?)	Delore
——	Morales
——	Braithwaite
1869	Carof
1870(?)	Bauer
——(?)	Braxton Hicks
——	Hartmann
——(?)	Huston
——	Miquel
——(?)	Philadelphia
——(?)	Richard
——(?)	Tarsitani-Lollini
——(?)	Winn
1871	Barclay
——	Gordon
——	Tauri
——	Long
1872	Robertson

1872	Rohrer
1873	Lowenthal
——	Vacher
——	Madden
1874	Clay
——	McBride
——	Pros
——	Roler
——(?)	Roussel
——(?)	Taylor, W. H.
——	Vedeler
1875(?)	Budd
——	Burdick
——	Laroyenne
——(?)	Leishman
——	Newman
——	Roger
——	Taylor, I. E.
——(?)	Wilson
——	Smith
——(?)	Trelat
1876	Draper
——(?)	Cole
——(?)	Olshausen
——	Sawyer
——(?)	Brickwell
——	Young
1877	Cleeman
——	Galabin
——	Hubert (Junior)
——	Stuart
——	Tarnier (ten models)
1878	Anderson
——	Barnes
——	Bell
——	Mathieu
——	Morgan
——	Porteus
——	Reid
——	Sanctuary
——	Sullivan
——	Vedder
1879	Simpson (A. R.)
——	Duke
——	Hilliard
——	Jenks
——	Keiller
——	Marshall
——	Roberton
——	Thorburn
1880(?)	Breisky
——(?)	Boisliniere
——	Bartlett
——(?)	Blake
——(?)	Brickel
——	Burge
——(?)	Corning
1880(?)	Duke
——(?)	Godson
——(?)	Hale
——(?)	Holmes
——(?)	Ives
——	Lusk
——	Mackintosh
——(?)	Mathew
——(?)	McLane
——(?)	Miller
——(?)	Neal
——(?)	Paramentier
——(?)	Playfair
——(?)	Garland
——	Sanger
——	Wilson
1881	Beluzzi
——	M.Vie
——	Lyon
——	Poullet
1882	Bartlett
——	Breus
——	Giordano
——	Grainger
——	Macdonald, A. D.
——	Studley
——	Howard
1883	Crouzat
——	Parsons
1884	Connel
——	Macdonald
——	McFerran
——	Schuyler
1885(?)	Bowers
——(?)	Cameron
——(?)	Davis, J.
——	Felsenreich
——(?)	Hunter
——	Jewett
——(?)	Neale
——	Matos
——	Partridge
——(?)	Pierce
——(?)	Robinson
——(?)	Rockwell
——	Ruth
——	Thomas
——(?)	Trueheart
——(?)	Tucker
——(?)	Parvin
1886	Braun
——	Holland
——	MacMunn
——	MacLaurin
——	Stephenson
——	Stone
——	Wells

1887	Foulis
——	Haslam
——	Pearce
——	Poullet
——	Stewart
——(?)	Reamy
1888	Reynolds
——(?)	Gillette
——	Grattan
——	Kade
——(?)	Priestley
1889	Blenkarne
——	Bredin
——	Fry
——	Lange
——	McGillicudy
——(?)	Prague
——	Sloan
——	Borjakowsky
1890(?)	Adams
——	Ashwell
——(?)	Baker Brown
——(?)	Chida
——(?)	Frost
——(?)	Hamada
——(?)	Hecker
——(?)	Holt
——(?)	Leavitt
——(?)	Leipzic
——	Pazzi
——(?)	Ramdohr
——(?)	Sakaki
——(?)	Walcher
——(?)	Wagstaff
——(?)	Weiss
1891	Elston
——	Lyman
——	Murray
1892	Gardner
——	Heestenburghe
——	Horrocks
——	Taylor, G.
——	Herff
1893	Aitken
——	Arnold
——	Cameron
——	Tournay
1894(?)	Cullingworth
——(?)	Dauber
——	Dewees
——	Dimant
	Hamilton
——	Kiaer
1895	Penoyee
——	Bourke
——(?)	Cole Tarnier
——	Fisher
1895	Jewett
——(?)	Kufferat
——(?)	Knox
——(?)	Lees
——(?)	Pearse
——(?)	Pendergast
——(?)	Shoemaker
——(?)	Stephenson
——(?)	Stewart
——(?)	Swedish
——(?)	Wales
——(?)	Williamson
——(?)	Wood
1896(?)	Champneys
——(?)	Le Page
——	Macness
——(?)	Neville
1897	Fochier
——(?)	Purchas
1898	Benjamin
——	Mathew, (F)
——(?)	Palmer
——(?)	St. Bartholomew's Hospital
——(?)	St. George's Hospital
1899	Berthold
——(?)	Davis
——	Demelin
——(?)	Hegar
——(?)	Hensoldt
——(?)	Holborn
——	Ponder
——(?)	Scrogg
1900(?)	DeLee
——(?)	Dewey
——(?)	Hart
——(?)	Higgins
——(?)	Hirst
——	Inman
——(?)	Morrison
——(?)	Pippingshold
——(?)	Schoelhammer
——(?)	Tibone
——(?)	Werneck
——(?)	Perret
1901	Stawell
——	Opitz
——	Malatesta
1902	Beck
——	Bonney
——	Mocquot
——	Vlaicos
1903	Freund
——	Friedman
——	Parodi
1904	Greville
——	Hubert
——	Petrides

1905	Jacobson
——	Maxwell
——	Neil
1906	Vlaicos
——	Morgan
——	James
1907	Audebert
——	Boerma
——	Gallant
——	Good
1908	Arnoux
——	Stockmam
——	Macan
——	Massimi
1909	Latzko
1910	Kosmak
——(?)	Leipmann
——(?)	Leonard
——(?)	Maclintock
——(?)	Macdonald
——(?)	Schwartz
1910	Tristan
——	Williams
1911	Ferguson
——	Knapp
1912	Das
——	Farrior
——	Jaks
1913	Stack
1915	Irving
——	Kielland
——	Wichmann
1916	Beck
1922	Farmer
1923	Foulkrod
1924	Bill
1925	Barton
1926	Thomasz
——	Dolsen
1927	Bland
——	Zweifel (jun)

V. Resume of Doran's "A Chronology of the Founders of the Forceps (1569—1799).

From the Journal of Obstetrics and Gynæcology of the British Empire Vol. XXVII. pp. 154-172.

1569. William Chamberlen leaves France and lands at Southampton.
1572. Birth of Peter the younger, son of William.
1596. Peter the younger admitted to the Company of Barber Surgeons.
1598. Peter the elder's name appears in the "Annals of the Barber Surgeons' Company."
1600. Peter Chamberlen the younger was licensed to practise midwifery.
1601. Birth of Dr. Peter Chamberlen, son of Peter the younger.
1619. Dr. Peter Chamberlen graduated as Doctor of Medicine at Padua.
1620. Dr. Peter Chamberlain was incorporated on the Padua degree at Oxford.
1621. Dr. Peter Chamberlen was incorporated on the Padua degree at Cambridge.
1626. Death of Peter Chamberlen the younger at Downe, Kent.
1628. Dr. Peter Chamberlen admitted Fellow of the College of Physicians.
1628. Peter Chamberlen the elder appears as a court obstetrician.
1630. Birth of Dr. Hugh Chamberlain the elder, son of Dr. Peter.
1631. Peter Chamberelen died, probably at Downe in Kent. Probably the inventor of the "saving" midwifery forceps.
1634. Negotiations with the College of Physicians for the establishment of a Corporation of Midwives with Dr. Peter Chamberlen as Governor.

It was objected that Dr. Chamberlane (sic) practised midwifery "as a Physician" and should have nothing to do with midwives than "other of the Physitians of the College have whose advice they crave when occasion requyres it and whose Judgemts no doubt are as good as his in any accidents that may befall or concerne women wth child vnless itt be in the very act of deliv'ie of vnnaturall and dangerous births to effect wch there is necessitye of using of instrumts of iron, being indeed more pperly the work of a Surgeon than a Physitian; so with manuall practize the said Dr. hath applied himself more than others by reason few, or none can break the practise thereof."

This document proves that as early as in 1634 the profession was well aware that the Chamberlens used special "instruments of iron," so that they must already have been in use for many years.

1635. Birth of Paul, son of Dr. Peter Chamberlen.

1650. Palfyn born at Ypres.

1664. Birth of Dr. Hugh Chamberlain, Junior.

1668. According to R. W. Johnson (see 1769), Drinkwater of Brentford began to use in this year a forceps which came into Johnson's possession.

1670. Hugh Chamberlen, senior, visits Paris, and fails to deliver Mauriceau's patient.

1672 Hugh Chamberlen's translation of Mauriceau's work on Midwifery published.

1683. Death of Dr. Peter Chamberlen at Woodham Mortimer Hall, Essex. The forceps, etc., were discovered there in 1818, and are now in the library of the Royal Society of Medicine.

1689. Hugh Chamberlen, Junior, created M.D. Cantab.

1700. John Chamberlen's will proved on January 6th. He was a son of Dr. Peter and, like his brothers Hugh, Senior, and Paul, he practised midwifery and possessed the family secret.

1702. Hugh Chamberlen, Senior, practised in Amsterdam, and sold the family secret of the forceps to Roonhuysen.

1710. Swift, in his journal to Stella, letter viii, Nov. 5 refers to "Dr. Chamberlain." Burton ("Dr. Slop") born at Colchester.

1717. Death of Paul Chamberlen.

1718. Hypothetical date of birth of "Tristram Shandy" (Bk. III, Chap. 3). Burton, or "Dr. Slop," was only a year old at this date.

1720. Palfyn exhibits his *mains de fer* before the French Academie Royale des Sciences. Smellie in practice in Lanark. Dr. Hugh Chamberlen, the elder mentioned as living, in a legal document. He was apparently in Holland. The date of his death has been lost.

1721. Tobias Smollett born. De la Motte in his "Traite complet des Accouchements" denounces secrecy about obstetrical instruments, specially mentioning a "certain surgeon from Ghent who had exhibited his forceps at Paris,"—meaning Palfyn.

1723. The Faculty of Paris declare its approbation of Palfyn's forceps.

1724. Heister of Helmstadt first figured Palfyn's forceps from a sample lent to him by a friend.

"For indeed truly Cl. Laurence Heister (late Professor in the University which is at Helmstadt, who first, as far as I know, had 'Palfyn's Forceps' drawn from the very specimen which a certain friend had shown him) gave a drawing different from the descriptions of Levret and de Wind; but one can hardly believe that this (drawing) refers (to) Palfyn's instruments for reasons given." (Mulder.)

1726. Date of first case (No. xiv) where Giffard distinctly states that he made use of his forceps (see 1734).

1728. Death of Hugh Chamberlen, junior, and of Drinkwater of Brentford.

1730. Death of Palfyn.

1733. Butter exhibits a sample (see 1734) of Dusee's forceps at Edinburgh: report is preserved in "Medical Essays and Observations: Revised and published by a Society in Edinburgh," vol. iii, p. 322 (2nd edition, published 1737). A double-jointed forceps with pivot removable so as to fit either joint. No other two-jointed forceps is figured or noted in Mulder's work. Nor is any such forceps represented in either of Kilian's atlases excepting that designed by Thureaud of New Orleans in the 19th century; its blades were reversible as in Tarsitani's and Rizzoli's forceps.

First edition of Chapman's "Essay on the Improvement of Midwifery." No drawing of his forceps (see 1735). Chapman mentioned in this edition how he fashioned a movable screw, and losing it at a delivery found that his forceps acted "much better" without it. That was really the origin of the English lock, perfected by Smellie. There is no evidence that Smellie had ever used the forceps at this date (1733), and McClintock believes that Chapman's example inspired him.

Dr. Burton ("Dr. Slop"), St. John's College, Cantab, took the M.B. degree and began practice at Heath, near Wakefield.

1734. Death of Dusee.

Dr. Hody, F.R.S., publishes "Cases in Midwifry (sic.): Written by the late Mr. William Giffard, Surgeon and Man Midwife." Hody dates his preface "July 30, 1733;" his title page bears the date 1734. Hody figures not only "Mr. Giffard's Extractor," but also "The Extractor as improved by Mr. Freake, Surgeon to St. Bartholomew's Hospital," without any mention of it in the text. No note of it by Freke himself is extant. It was the first forceps with jointed handle like Saxtorph's.

1735. Second edition of Chapman's "Essays," published with a figure of his forceps. He admits that he was wrong in not publishing "a Figure of my Forceps" in his first issue and therefore he now adds an exact draught of it."

1736. John Douglas published his "Short Account of the State of Midwifery in London." He blamed Chapman for keeping his forceps secret for so long.

1737. Smellie made use of Dusee's forceps and rejected them. Hence McClintock infers that Smellie had little, if any, experience of the forceps at that date.

Death of Guillaume Mauquest de la Motte. An adversary of Palfyn and disbeliever in the forceps. He was a great advocate of podalic version.

1739. Smellie (born 1697 in or near Lanark) came up to London.

1740. Pugh first used his forceps with pelvic curve about this year.

1741. Mesnard's *tenettes a cuiller*, which had blades that did not cross, reported by the inventor in the "Journal de Verdun."

1743. Mesnard describes his forceps in "Le guide des accoucheurs ou le Maistre dans l'art d'accoucher les femmes." Blades somewhat like Palfyn's united by a chain.

1744. Smellie introduced his special lock. "In his letter to Mr. John Gordon, surgeon, at Glasgow, dated Jan. 12th, 1747-8." Smellie says: "About three years ago I contrived a more simple method of fixing the steel forceps by locking them into one another by which means they have all the advantages of the firmer kind without their inconveniences."

1746. Boehmer of Halle (1717—1719) translated Manningham's "Artis Obstetriciæ Compendium" (see 1726 and 1729), to which translation Mulder adds. loc. cit., p. 25, "Gregorianæ forcipis delineationem simul et descriptionem satis accuratam subjunxit." Boehmer, in the appendix to this translation, headed "De Use et Praesentia Forcipis Anglicanae," describes Gregoire Junior's forceps of which no account by the inventor is known.

Smellie used his own short forceps and failed to deliver with them (Case 381) its handles not yet "altered from crooks to wooden handles as I now (1751) have them."

1747. Levret brings before the Paris Academy his forceps with *la nouvelle courbure* and describes it in his "Observations sur les causes et les accidens de plusieurs accouchemens laborieux" published in the same year; he also figures his forceps with the curve (see 1749 and 1751).

Rathlauw designed his forceps, but was forbidden to practise in Amsterdam, as he was not acquainted with the secret of Roonhuysen which the latter had bought of Hugh Chamberlen, Senior, who had retired to Holland and died there, at a date which has been lost. Rathlauw published "Het berugt geheim in de Vroedkunde van Rogier Roonhuysen outdekt en uitgegeven op hooge order door Jan Pieter Rathlauw, Vroedmeester" (Amst., 1747), exposing, as he believed, the secret. The proprietors of the secret, five obstetricians of Amsterdam, at once published a reply denying that Rathlauw had revealed any secret (see 1754 and Mulder, loc. cit., p. 28). Rathlauw's forceps was, unless Schlichting's was of older date, the first which, like Assalini's, had its joint at the free end of the handle; his first pattern was not fenestrated, but he also described in his pamphlet another pattern with fenestrated handles, and the shank of one blade passes through that of the other.

Schlichting, in the same year, 1747, publishes his "Embrylucia nova detecta," and describes and figures a forceps very similar to Rathlauw's first pattern, having no fenestræ, and a joint as in Assalini's much later and better known instrument. He ascribed its invention to Brederode or Ruisch.

1749. An anonymous critic writes against Levret's forceps in the "Journal des Scavans" (August), saying that the instrument was well-known but that nobody had ever had a single opportunity of using it (see 1751).

1750. First notice of Bing's forceps, Janck publishing at Leipzig his "Commentatio de forcipe ac forfice ferramentis a Bingio inventis, eorumque usu in partu difficili" (see 1751).

1751. Levret, in reply to his critic (see 1749), publishes his "Suite des observations sur les causes et les accidens," etc. (see 1747), reporting a case where his forceps was successfully used, the head presenting.

Smellie described his curved forceps in the same year. His "Essay on Midwifery," dated 1752, was issued in the previous year, being noticed in the "Monthly Review," December, 1751. Smellie already used forceps with wooden handles instead of crooks (see 1746), and Dr. William Douglas objected to the wooden forceps. In Case 269 Smellie "now substituted steel covered with leather in the room of wood which is not so durable." This is the only occasion on which he speaks of this short forceps, but there is no date.

Paulus de Wind publishes "t Geklemd Hoofd geredt," relating his association with Dusee (see 1734) and describing his own forceps,

the blades of which were solid and completely separate, having no joint or lock, nor were they made to cross.

Jens Bing, born in 1681 at Drontheim, Norway, died in Copenhagen, where he had a large practice and invented his forceps, non-fenestrated, and with long handles made to be detached. The object was the application of the blades with as little exposure as possible. Levret, in his "Suite des Observations," etc., condemns Janck and Bing for this alleged advantage in the "*forceps de Bingius.*"

Publication of Burton's "Essay towards a Complete new System of Midwifery." This is the five shilling book upon the subject of Midwifery mentioned in "Tristram Shandy," Bk. I, Chap. XVIII. His forceps had been already in use. He rightly condemned Smellie's practice of wrapping the blades in leather.

1752. Smellie, in Case 315, after-coming head, found that the short straight forceps was useless and made use of a longer curved instrument.

1753. In Case 352, Smellie completed delivery by the employment of a long double-curved forceps. "They were contrived *some years ago* by myself *as well as other practitioners* on purpose to take a better hold of the head when presenting and high up in the pelvis; but I did not recommend their use in such cases for fear of doing more harm than good by bruising the parts of the woman when too great force is used." But Smellie had described his curved forceps in 1751 (see 1751).

1754. Pugh, of Chelmsford, publishes his "Treatise of Midwifery," and speaks of "the forceps I invented upwards of fourteen years ago" (see 1740).

1755. In a case where the feet and hands presented, Smellie brought down the body and then delivered the head with double-curved forceps.

1767. Stein, independently of other writers, notes how Levret modified his forceps more than once.

1769. R. Wallace Johnson, inventor of the perineal curve, published "A New System of Midwifery," where, according to Aveling this new curve is first mentioned.

1770. Fried's forceps probably first used.

Fourth edition of Levret's "Observations" and "Suite des Observations," published together. The drawing in the earlier editions in the first part, representing the three-bladed forceps and the two-bladed forceps with *axe ambulant*, is reproduced, and the *forceps a courbe*, with a simple lock, is represented in the *Suite*.

1771. Fries, a pupil of Fried's describes Fried's forceps in his Dissertatio de usu forcipis in partu. "It has Levret's blade and Smellie's handle and lock." Mulder believed that the arrangement by which one handle moved by aid of a screw on its own axis was suggested by Frere Jean de Come's lithotomy forceps.

1774. Leake, of the Westminster Hospital, in his "Lecture Introductory to the Theory and Practice of Midwifery, including the Description and Use of a New Forceps," publishes an account of his three-bladed forceps (see Denman, 1783). J. L. Petit's forceps, "already long in use" (Mulder, op. cit., p. 57), first described and figured in Lesne's Traite des maladies chirurgicales et des operations qui leur convenient. Admittedly a modification of Gregoire's instrument, it has a catch on one handle with teeth on the opposite side, to regulate the pressure on the fœtal head during extraction.

1777. Van de Laar describes his forceps "Schets der geheele Verloskunde geschikt om derselver grondbeginzels volkomen te leeren." 's Gravenhaage, 1777. Van de Laar introduced axis traction, this year, by drawing directly from the blades by means of a rod, which was

straight. In 1844 T. Homann devised a straight rod; in 1877 Tarnier introduced curved axis tractors.

Coutouly junior's forceps described by Catalan in the "Journal de Paris," Dec. 6.

1781. Pean's forceps adopted by J. L. Baudelocque in his Art des Accouchemens.

1782. Lowder, in M.S. lectures on the "Theory and Practice of Midwifery" (Lib. Royal Soc. Med.), mentions Orme as modifying Smellie's forceps.

1783. Sleurs describes his vectis and a double vectis making a forceps, in his "Vroed en werktuigkundige proefnemingen waar door de Hefboom verbeterd en deszelvs gebruik, tot redding van de geklemde of door de beenderen des bekkens opgehoudene hoofden, uitgestrekter en veiliger gemaakt word," a pamphlet published in this year in Utrecht.

Denman publishes an anonymous pamphlet on Leake's three-bladed forceps: "A Vindication of the Forceps described and recommended by Dr. Leake; by a Late Pupil of Dr. Leake's."

Carl Gottlob Kuhn publishes the first printed account of Orme's and of Lower's forceps in a thesis, reprinted in 1827 with his other works under the title "Opuscula Academica Medica et Philologica."

1784. Young of Edinburgh's forceps, of the R. Wallace Johnson type (see 1769), mentioned in the edition of Smellie's Midwifery published this year, vol. iii, fig. 40.

Evans of Oswestry's forceps, also of the R. W. Johnson type likewise described in the same edition of Smellie's work. The blades had the double Johnson's curve and did not diverge immediately above the lock but ran straight and parallel for some distance. Hence Evans' forceps is the prototype of Simpson's and similar instruments invented in the nineteenth century, where there is gap between more or less parallel and straight shanks, modified as a ring in Hopkins' and, later, in Barnes' forceps.

First edition of Aitken's "Principles of Midwifery or Puerperal Medicine." He mentions his modified lock.

1785. Mayer writes on Levret and modifies his forceps.

Second edition of Aitken's "Principles," includes a drawing of his forceps applied to the after-coming head.

Starke of Jena's forceps described by his pupil, Dobner.

1786. Third edition of Aitken's "Principles." Besides the graduated lock there was a wide space between the shanks of the blades for the obstetrician's middle finger, while there was a blunt knob on the upper border of each handle, close to the lock on which the fore and ring fingers rested. ("By this disposition the mother's parts are fully protected.") The knobs did not correspond to the flanges or finger rests.

1788. Coutouly's modification (see 1777) made known by Mithof in his "Nouveaux Forceps, presentes a l'Academie Royale de Chirurgie, a la seance publique en 1788, M. Coutouly."

1789. J. L. Baudelocque admits of priority of Pean in design of forceps named Baudelocque's (see 1781).

1791. Matthias Saxtorph publishes a paper at Copenhagen on his forceps (see Mulder, op. cit., p. 81), with handles made to fold on the blades. A similar forceps, Levy's modification, was still used in Denmark in 1866.

1792. Osborn's "Essays on the Practice of Midwifery" published. It included a drawing of the author's forceps with measurements.

Osborn's and Saxtorph's forceps were short, yet had a pelvic curve like in Levret's long forceps.

Thynne, about this year, introduced a similar forceps, of the same length as Osborn's but with longer blades and therefore shorter handles.

1793. Denman publishes his "Aphorisms on the application and Use of the Forceps and Vectis."

Hamilton's jointed forceps first described in Andrew Duncan's "Medical Commentaries," for 1793, decade 2, vol. viii, p. 405.

Rawlins, of Oxford, publishes "A Dissertation on the Structure of the Obstetric Forceps, pointing out its defects, and especially of those with Double Curved Blades." Rawlins' work gained the approval of Mulder who describes the forceps and figures the *"Brachium forcipis* Rawlinsii."

Nearly thirty years later David Davis attacked Rawlins, and commented unfavourably on Mulder.

1794. Mulder's "Historia Litteraria et Critica Forcipum et Vectium Obstetriciorum" published at Leyden.

1796. Johann David Busch publishes his "Beschriebung einer neuen Geburtszange, nebst einigen Beobachtungen über ihre Anwendung" in Stark's Archiv für die Geburtshülfe, etc., vol. vi, pt. 3. It is the first instrument that bore flanges or finger rests, adopted by Naegeli and Simpson afterwards, and constructed with joints by Stoltz (1839) and Levy (1866).

1798. Schlegel's translation of Mulder's "Historia Forcipum" appears.

SECTION XI.

FORCEPS (OR FOUNDERS OF FORCEPS) IN ALLEGORY, LITERATURE AND ART.

(1) ALLEGORY.

An allegorical picture is to be found on the title page of a book on Midwifery in the Polish language—Ssteidelés Kunstu Babstein—published in 1778. The book does not contain

FIG. 871.

a description of the picture but evidently it alludes to the advent of the forceps as a conservative instrument and the discarding of destructive implements of obstetrics. (See fig. 871).

(2) LITERATURE.

(*a*) *Jonathan Swift* in his "Journal to Stella" letter VIII Nov. 5, 1710 refers to "Dr. Chamberlain" thus:—"I was with Mr. Harley from dinner to seven this night and went to the Coffee-house, where Dr. D'Avenant would fain have had me gone and drink a bottle of wine at his house hard by with Dr. Chamberlain, but the puppy used so many words that I was afraid of his company; and though we promised to come at eight, I sent a messenger to him, that Chamberlain was going to a patient and therefore we would put it off till another time: * * *" Evidently the reference is to Hugh Chamberlen the younger (1664-1728) with literary pretensions.

(*b*) *Laurence Sterne* in his "Life and opinions of Tristram Shandy, Gentleman" has immortalized Dr. Burton as "Dr. Slop" (see fig. 168). The book contains numerous references to Midwifery and midwives. The following extracts contain specific references to forceps.

(1) Book II, Chapter XI.

"Besides, great son of Pilumenus! What canst thou do?—Thou hast come forth unarmed;—thou hast left thy *tire-tete*,—thy, new-invented forceps,—thy crotchet,—thy squirt, and all thy instruments of salvation and deliverance, behind thee,—By Heaven! at this moment they are hanging up in a green bays bag, betwixt thy two pistols, at the bed's head! Ring call!;—send Obadiah back upon the coach-horse to bring them with all speed."

(2) Book II, Chapter XVIII.

"Sir, replied Dr. Slop, it would astonish you to know what improvements we have made of late years in all branches of obstetrical knowledge, but particularly in that one single point of the safe and expeditious extraction of the fœtus,—".

(3) Book II, Chapter XIX.

"Of all men in the world, Dr. Slop was the fittest for my father's purpose;—for though this new invented forceps was

the armour he had proved, and what he maintained to be the safest instrument of deliverance, yet, it seems, he had scattered a word or two in his book, in favour of the very thing which ran in my father's fancy;—tho' not with a view to the soul's good in extracting by the feet, as was my father's system,—but for reasons merely obstetrical."

(4) Book III, Chapter XV.

"Dr. Slop was within an ace of being an exception to all this argumentation: for happening to have his green baize bag upon his knees, when he began to parody my uncle Toby—'twas as good as the best mantle in the world to him: for which purpose, when he foresaw the sentence would end in his new-invented forceps, he thrust his hand into the bag in order to have them ready to clap in, where your reverences took so much notice of the * * *, which had he managed—my uncle Toby had certainly been overthrown: the sentence and the argument in that case jumping closely in one point, so like the two lines which from the salient angle of a ravelin,—Dr. Slop would never have given them up;—and my uncle Toby would as soon have thought of flying, as taking them by force: but Dr. Slop fumbled so vilely in pulling them out, it took off the whole effect, and what was a ten times worse evil (for they seldom come alone in this life) in pulling out his forceps, his forceps unfortunately drew out the squirt along with it.

When a proposition can be taken in two senses—'tis a law in disputation, that the respondent may reply to which of the two he pleases, or finds most convenient for him.—This threw the advantage of the argument quite on my uncle Toby's side.—"Good God!" cried my uncle Toby, "are children brought into the world with a squirt?"

(5) Book III, Chapter XVI.

"—Upon my honour, Sir, you have tore every bit of skin quite off the back of both my hands with your forceps, cried my uncle Toby—and you have crushed all my knuckles into the bargain with them to a jelly. 'Tis your own fault, said

FIG. 872.

Dr. Slop—you should have clinched your two fists together into the form of a child's head as I told you, and sat firm.—I did so, answered my uncle Toby.—Then the points of my forceps have not been sufficiently armed, or the rivet wants closing—or else the cut on my thumb has made me a little awkward—or possibly —'Tis well, quoth my father and interrupting the detail of possibilities—that the experiment was not first made upon my child's head-piece—It would not have been a cherry—stone the worse, answered Dr. Slop.—I maintain it, said my uncle Toby, it would have broke the cerebellum (unless indeed the skull had been as hard as a granado) and turned it all into a perfect posset. —Pshaw ! replied Dr. Slop, a child's head is naturally as soft as the pap of an apple ;—the sutures give way—and besides, I could have extracted by the feet after.—Not you, said she.—I rather wish you would begin that way, quoth my father.

Pray do, added my uncle Toby."

(6) Book III, Chapter XVII.

"—And pray, good woman, after all, will you take upon you to say, it may not be the child's hip, as well as the child's head?—'Tis most certainly the head, replied the midwife. Because, continued Dr. Slop (turning to my father) as positive as these old ladies generally are—'tis a point very difficult to know—and yet of the greatest consequence to be known ;—because, Sir, if the hip is mistaken for the head—there is a possibility (if it is a boy) that the forceps * * * * *

—What the possibility was, Dr. Slop whispered very low to my father, and then to my uncle Toby.—There is no such danger, continued he, with the head.—No, in truth, quoth my father—but when your possibility has taken place at the hip—you may as well take off the head too.

—It is morally impossible the reader should understand this—'tis enough Dr. Slop understood it ;—so taking the green baize bag in his hand, with the help of Obadiah's pumps, he tripped pretty nimbly, for a man of his size, across the room to the door—and from the door was shown the way, by the good old midwife, to my mother's apartment." (See fig. 872).

(7) Book III, Chapter XXVII.

"—This unfortunate draw-bridge of yours, quoth my father—God bless your honour, cried Trim, 'tis a bridge for master's nose.—In bringing him into the world with his vile instruments, he has crushed his nose, Susannah says, as flat as a pancake to his face, and he is making a false bridge with a piece of cotton and a thin piece of whalebone out of Susannah's stays, to raise it up."

Fig. 873.

(8) Book III, Chapter XXX.

"No doubt, the breaking down of the bridge of a child's nose, by the edge of a pair of forceps—however scientifically applied—would vex any man in the world, who was at so much pains in begetting a child, as my father was—yet it will not account for the extravagance of his affliction, nor will it justify the unchristian manner he abandoned and surrendered himself up to."

(3) ART—CARICATURE.

(*a*) The forceps in "Political caricature" finds a place in France and two of these are reproduced from Witkowski's "Les Accouchements dans les beaux-arts, dans la litterature et au theatre."

(*i*) The last moments of the Republic is represented in Fig. 873. "Bonaparte first consul would like to

FIG. 874.

know the future which is in the abdomen of Madame Angot. Holding two bent swords, crossed in the shape of forceps, Bonaparte gets ready to perform the operation."

(*ii*) One remembers with what pangs President Grevy was forced, by public opinion, to submit his

resignation. The caricaturist Gilbert-Martin has very clearly expressed the pains caused by the difficulty of the operation (see fig. 874). Three verses accompany the caricature. A free translation in English is given below.

You see him anxious and fierce
Losing modesty and pride
With the yells of a woman in labour
Clinging to the Presidential chair.

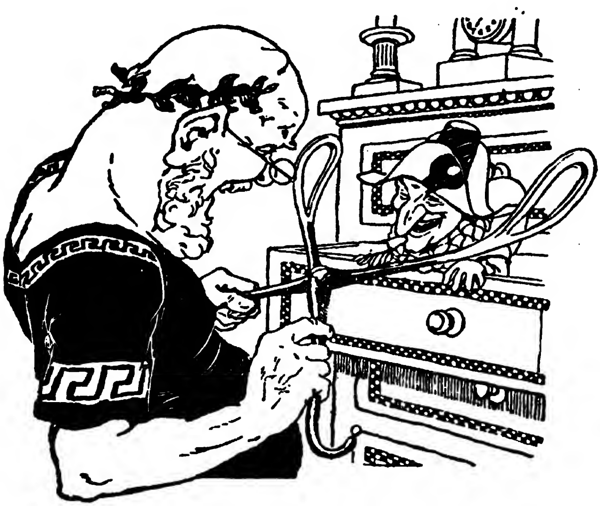

FIG. 875.

The resignation over-due
Has already its sponsor ready.
Squeezing his sides he looks himself in
To avoid the sceptre of the Congress.

But the midwife, the deuce
With plenty of muscles.
Has to extract from his abdomen
Decided to take the forceps.

FIG. 876.

(*b*) Forceps in comic art is illustrated in fig. 875. It evidently represents the process of extraction of wit out of a wooden cup-board.

(*c*) A caricature portrait of Sir Alexander Russel Simpson entitled "Facile Forceps" appeared some time ago in the Student's Magazine of Edinburgh. This has been reproduced in fig. 876.

APPENDIX OF

Table

From Mulder's

FORCEPS WITH

No.	Name of Inventor.	Length of forceps.	Length of blade.	Length of handle.	Angle of divergence of blades.
1	Rueff	11	$5\frac{5}{12}$	$4\frac{7}{12}$	...
2	Palfyn I	14	9	5	80°
3	Palfyn II	15	$10\frac{1}{2}$	$4\frac{1}{2}$	14°
4	An unnamed $ 7 ...	15	$8\frac{1}{2}$	$6\frac{1}{2}$	36°
5	Dusee	16	$10\frac{3}{4}$ $8\frac{1}{4}$	$5\frac{1}{4}$ $7\frac{3}{4}$	34°
6	Giffard	$12\frac{1}{2}$	$7\frac{1}{4}$	$5\frac{1}{4}$	40°
7	Freake	12	$6\frac{1}{2}$	$5\frac{1}{2}$	34°
8	Chapman	15	$9\frac{3}{4}$	$5\frac{1}{4}$	22°
9	An unnamed $ 11 ...	$14\frac{1}{2}$	$8\frac{1}{2}$	6	34°
10	Mesnard	12	$8\frac{1}{4}$	$3\frac{3}{4}$	40°
11	Gregoire	15	$8\frac{1}{3}$	$6\frac{2}{3}$	34°
12	Rathlaw I	$13\frac{1}{2}$	$6\frac{1}{2}$	7	46°
13	Rathlaw II	$15\frac{1}{2}$	7	$8\frac{1}{2}$	52°

MEASUREMENTS.

I.

Historia.

CEPHALIC CURVE ONLY.

Distance of extremity of blades from lock.	Greatest distance between the blades.	Distance from the point of widest divergence to the extremity.	Distance between tips.	Greatest breadth of the blades.	Distance of the greatest breadth of blade from its extremity.	Length of fenestrum.	Greatest breadth of fenestrum.	No.
5	...	...	...	...	...	...	...	1
6	3	3	...	...	...	...	...	2
$5\frac{1}{2}$	$3\frac{1}{3}$	$2\frac{1}{2}$	...	$1\frac{2}{3}$	$1\frac{1}{4}$	...	...	3
$5\frac{1}{2}$	$2\frac{1}{2}$	$2\frac{1}{3}$	...	...	...	...	...	4
$7\frac{1}{2}$	4	$2\frac{7}{12}$	$1\frac{1}{3}$	2	...	...	...	5
$6\frac{2}{3}$	$2\frac{2}{3}$	2	2	$1\frac{3}{4}$	$1\frac{5}{6}$	$4\frac{7}{12}$	$1\frac{1}{4}$	6
$5\frac{3}{4}$	$2\frac{1}{2}$	$1\frac{3}{4}$	2	$1\frac{2}{3}$	$1\frac{7}{12}$	$3\frac{2}{3}$	1	7
9	$2\frac{1}{3}$	$3\frac{5}{6}$	...	$1\frac{2}{3}$	$1\frac{1}{3}$	5	$1\frac{1}{4}$	8
$6\frac{7}{12}$	2	$2\frac{3}{4}$	...	$1\frac{2}{3}$	1	$4\frac{1}{2}$	$1\frac{1}{4}$	9
5	$2\frac{1}{2}$	$2\frac{1}{2}$	...	...	...	...	...	10
7	$2\frac{3}{4}$	$2\frac{1}{6}$	$1\frac{1}{4}$	$1\frac{2}{3}$	1	$5\frac{5}{6}$	$\frac{5}{6}$	11
$6\frac{1}{2}$	$2\frac{1}{2}$	$3\frac{1}{2}$	$\frac{1}{4}$	1	...	...	...	12
$6\frac{7}{12}$	3	$2\frac{1}{4}$	1	...	...	$2\frac{1}{3}$	...	13

FORCEPS WITH

No.	Name of Inventor.	Length of forceps.	Length of blade.	Length of handle.	Angle of divergence of blades.
14	Schlichting	13½	6	7½	80°
15	Levret I	18	9½ / 10½ / 11½	8½ / 7½ / 6½	10°
16	Bing	18½	9¾	8¾	24°
17	Levret II	16¼	9½	6¾	14°
18	Burton	11½	3¾	7¾	varies
19	de Wind	9½	7½	2	20°
20	Smellie I	11	6½	4½	80°
21	Smellie II	12½	7¾	4¾	54°
22	Pugh I	11	7¼	3¾	18°
23	Pugh II	14	8¾	5¼	46°
24	Levret III	15½	8½	7	18°
25	Johnson	11	6⅔	4⅓	66°
26	Fried	15½	8½	7	18°
27	Leake (*)	13	7$\frac{11}{12}$	5½	60°
28	Petit	15	8⅓	6⅔	34°

*The third arm is 12½, blades 7$\frac{9}{12}$, handle 4$\frac{9}{12}$, the fenester 3$\frac{5}{12}$ long

CEPHALIC CURVE ONLY—*Contd.*

Distance of extremity of blades from lock.	Greatest distance between the blades.	Distance from the point of widest divergence to the extremity.	Distance between tips.	Greatest breadth of the blades.	Distance of the greatest breadth of blade from its extremity.	Length of fenestrum.	Greatest breadth of fenestrum.	No.
5½	$4\frac{5}{12}$	2¼	2⅙	1	...	...	...	14
8⅓	2¼	3⅔	¼	...	...	...	...	15
8	3¾	2½	⅓	2	1	...	...	16
$8\frac{5}{12}$	2½	3½	¼	1⅔	2	6¾	1	17
3¾	2	2	⅙	...	...	...	...	18
7½	1¾	4½	...	¾	...	...	...	19
6	2	3⅔	...	1⅙	1¼	4	¾	20
7	2	3¼	...	1⅓	1¾	5	¾	21
7	2½	3	⅙	1	1½	4	½	22
7¼	2½	3	¼	1⅓	1⅙	5½	⅚	23
7½	2	3	...	1½	1⅓	6	¾	24
6	2½	3½	...	1⅙	1⅔	3¾	½	25
7¼	2	3	...	1½	1⅓	6	¾	26
$7\frac{7}{12}$	2½	3	½	1½	⅚	4¾	⅚	27
7	2¾	2⅙	1¼	1⅔	1	5⅚	⅚	28

and 1⅙ broad. The distance at the greatest breadth to terminus is 1.

FORCEPS WITH

No.	Name of Inventor.	Length of forceps.	Length of blade.	Length of handle.	Angle of divergence of blades.
29	Van de Laar I ...	$12\frac{1}{3}$	$7\frac{5}{6}$	$4\frac{1}{2}$	44°
30	Van de Laar II ...	$12\frac{1}{2}$	$8\frac{1}{6}$	$4\frac{1}{3}$	36°
31	Coutouly I	$16\frac{1}{2}$	$9\frac{1}{2}$	7	20°
32	Pean	$17\frac{1}{2}$	10	$7\frac{1}{2}$	30°
33	Sleurs	$13\frac{1}{2}$	$8\frac{5}{6}$	$4\frac{2}{3}$	16°
34	Orme	$10\frac{1}{3}$	$5\frac{5}{6}$	$4\frac{1}{2}$	85°
35	Lowder	$11\frac{1}{3}$	$6\frac{1}{2}$	$4\frac{5}{6}$	83°
36	Young	$11\frac{1}{4}$	$6\frac{3}{4}$	$4\frac{1}{2}$	79°
37	Evans	$11\frac{2}{3}$	$7\frac{1}{6}$	$4\frac{1}{2}$	46°
38	Aitken I	$11\frac{1}{3}$	$7\frac{1}{6}$	$4\frac{1}{6}$	84°
39	Aitken II	$11\frac{1}{3}$	$7\frac{1}{6}$	$4\frac{1}{6}$	54°
40	Aitken III	$10\frac{5}{6}$	7	$3\frac{5}{6}$	52°
41	Mayer	$16\frac{1}{2}$	$9\frac{1}{2}$	7	18°
42	Starke	$12\frac{1}{4}$	$8\frac{1}{12}$	$4\frac{1}{6}$	35°
43	Coutouly II	$15\frac{1}{2}$	$10\frac{1}{4}$	$5\frac{1}{4}$	...
44	Coutouly III	15	$9\frac{1}{2}$	$5\frac{1}{2}$	...

CEPHALIC CURVE ONLY—*Contd.*

Distance of extremity of blades from lock.	Greatest distance between the blades.	Distance from the point of widest divergence to the extremity.	Distance between tips.	Greatest breadth of the blades.	Distance of the greatest breadth of blade from its extremity.	Length of fenestrum.	Greatest breadth of fenestrum.	No.
$6\frac{1}{3}$	2	$3\frac{1}{4}$	...	$\frac{3}{4}$	$1\frac{5}{12}$	...	...	29
7	$2\frac{1}{2}$	$3\frac{5}{12}$	$\frac{1}{4}$	$1\frac{1}{3}$	$1\frac{1}{12}$	$5\frac{7}{12}$	$\frac{3}{4}$	30
$8\frac{1}{2}$	$2\frac{1}{3}$	$3\frac{1}{4}$	...	$1\frac{2}{3}$	2	$6\frac{1}{2}$	$\frac{3}{4}$	31
9	$2\frac{1}{2}$	4	...	$1\frac{5}{12}$	$2\frac{1}{4}$	7	$\frac{5}{6}$	32
$7\frac{7}{12}$	2	$1\frac{3}{4}$	$\frac{1}{6}$	1	$1\frac{7}{12}$	$3\frac{1}{2}$	$\frac{5}{12}$	33
5	$2\frac{2}{3}$	$2\frac{3}{4}$	1	$1\frac{1}{2}$	$3\frac{1}{4}$	$3\frac{1}{2}$	$\frac{5}{6}$	34
6	$2\frac{2}{3}$	$3\frac{5}{12}$	$\frac{2}{3}$	$1\frac{1}{2}$	4	$4\frac{1}{2}$	$\frac{11}{12}$	35
$6\frac{1}{6}$	$2\frac{5}{12}$	$3\frac{1}{4}$	$\frac{1}{4}$	$1\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{3}{4}$	$\frac{2}{3}$	36
$5\frac{1}{4}$	$2\frac{5}{12}$	$3\frac{1}{12}$	$\frac{1}{3}$	$1\frac{1}{6}$	$1\frac{1}{6}$	4	$\frac{2}{3}$	37
$6\frac{1}{4}$	3	3	$\frac{1}{12}$	...	...	$4\frac{1}{6}$	...	38
6	$3\frac{1}{2}$	$2\frac{1}{4}$	$1\frac{1}{3}$	...	...	$4\frac{1}{6}$	...	39
$5\frac{1}{6}$	$3\frac{1}{3}$	2	$\frac{1}{2}$	...	...	...	...	40
$7\frac{1}{2}$	2	3	...	$1\frac{1}{2}$	$1\frac{1}{3}$	6	$\frac{3}{4}$	41
$6\frac{1}{3}$	$2\frac{1}{2}$	$2\frac{2}{3}$	...	$1\frac{1}{6}$	$1\frac{2}{3}$	4	$\frac{7}{12}$	42
...	2	...	...	$1\frac{1}{2}$	...	...	...	43
...	$1\frac{1}{4}$	...	...	...	...	...	...	44

FORCEPS WITH

No.	Name of Inventor.	Length of forceps.	Length of blade.	Length of handle.	Angle of divergence of blades.
45	Saxtorph	12	$6\frac{3}{4}$	$5\frac{1}{4}$	26°
46	Osborn	$11\frac{1}{4}$	$6\frac{3}{4}$	$4\frac{1}{2}$	75°
47	Rawlins	$10\frac{1}{2}$	$6\frac{1}{2}$	4	48°
48	Denman	$10\frac{3}{4}$	$6\frac{7}{12}$	$4\frac{1}{6}$	7[illegible]°
49	Thynne	11	7	4	65°
50	du Bois	$17\frac{1}{4}$	$9\frac{1}{2}$	$7\frac{3}{4}$	50°
51	Santarelli	12	$6\frac{1}{2}$	$5\frac{1}{2}$	49°
52	Weisse	16	10	6	...
53	Wrisberg	$15\frac{1}{2}$	$8\frac{9}{10}$	$6\frac{9}{10}$	...

CEPHALIC CURVE ONLY—*Concld.*

Distance of extremity of blades from lock.	Greatest distance between the blades.	Distance from the point of widest divergence to the extremity.	Distance between tips.	Greatest breadth of the blades.	Distance of the greatest breadth of blade from its extremity.	Length of fenestrum.	Greatest breadth of fenestrum.	No.
$6\frac{1}{4}$	3	$1\frac{3}{4}$	$\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{3}$	$4\frac{1}{4}$	$\frac{2}{3}$	45
6	$2\frac{3}{4}$	$3\frac{1}{4}$	$\frac{1}{12}$	$1\frac{1}{3}$	$1\frac{1}{6}$	$4\frac{1}{3}$	$\frac{11}{12}$	46
$5\frac{5}{6}$	$2\frac{3}{4}$	$2\frac{3}{4}$	1	$\frac{1}{2}$ u, $1\frac{1}{2}$	$\frac{2}{3}$	$4\frac{3}{4}$	1	47
$6\frac{1}{4}$	$2\frac{5}{12}$	$3\frac{5}{12}$	$\frac{1}{6}$	$1\frac{5}{12}$	$1\frac{1}{6}$	$4\frac{1}{2}$	$\frac{11}{12}$	48
$6\frac{1}{3}$	$2\frac{2}{3}$	$3\frac{1}{4}$	$\frac{7}{12}$	$1\frac{1}{3}$	$1\frac{1}{6}$	$4\frac{5}{12}$	$\frac{11}{12}$	49
$8\frac{1}{3}$	$2\frac{5}{12}$	$3\frac{5}{6}$	...	$1\frac{2}{3}$	$1\frac{1}{2}$	$5\frac{5}{12}$	$\frac{5}{6}$	50
$5\frac{8}{10}$	$2\frac{4}{10}$	$1\frac{9}{10}$	$\frac{1}{2}$	$1\frac{1}{2}$	1	$3\frac{6}{10}$	1	51
...	...	...	...	...	...	5	3	52
$6\frac{1}{10}$	2	...	...	$1\frac{4}{10}$	...	$4\frac{1}{2}$	$1\frac{1}{2}$	53

Table II.

From Mulder's Historia.

FORCEPS WITH PELVIC CURVE.

No.	Inventor	Length of curvature	Height of curvature above horizontal line	Height of curvature below horizontal line
1	Levret II ...	$8\frac{1}{3}$	$3\frac{1}{4}$	...
2	Smellie II ...	4	$1\frac{3}{4}$	...
3	Pugh I ...	$6\frac{1}{2}$	1	$\frac{3}{4}$
4	Pugh II ...	7	$1\frac{1}{4}$	...
5	Levret III ...	$7\frac{1}{3}$	$2\frac{1}{3}$	...
6	Johnson ...	$5\frac{1}{3}$	$\frac{5}{12}$	1
7	Fried ...	$7\frac{1}{3}$	$1\frac{1}{4}$	...
8	Leake ...	$6\frac{1}{2}$	$1\frac{1}{6}$	$\frac{1}{3}$
9	Van de Laar II	8	2	$\frac{2}{3}$
10	Van de Laar I	$7\frac{2}{3}$	2	1
11	Coutouly I ...	$8\frac{1}{6}$	$3\frac{2}{3}$	...
12	Pean ...	$8\frac{3}{4}$	$3\frac{1}{6}$	...
13	Sleurs ...	$8\frac{5}{12}$	$\frac{1}{6}$	1
14	Young ...	6	...	$1\frac{1}{4}$
15	Evans ...	$6\frac{1}{2}$	...	$1\frac{1}{2}$
16	Aitken I ...	...	...	...
17	Aitken II ...	...	...	...
18	Aitken III ...	...	...	...
19	Mayer ...	$7\frac{1}{3}$	$1\frac{1}{4}$	...
20	Starke ...	$4\frac{3}{4}$	$2\frac{1}{12}$	$\frac{1}{6}$
21	Coutouly II ...	...	...	...
22	Coutouly III ...	...	...	...
23	Saxtorph ...	$5\frac{5}{6}$	2	...
24	Osborn ...	$5\frac{1}{3}$	$1\frac{3}{4}$	...
25	Thynne ...	$5\frac{5}{6}$	$1\frac{5}{8}$	...
26	du Bois ...	8	$2\frac{5}{6}$	...

Table

From the Catalogue and Report of obstetrical and other
Obstetrical Society of
BRITISH

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrums.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
1		Barnes ...	Weiss ...	15	$9\frac{3}{4}$	$6\frac{3}{4}$	$4\frac{1}{2}$	2	1	3
2	1842	Beatty, T. E.	Beatty, T. E.	12	8	$7\frac{1}{2}$	$5\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{8}$	3
3		Bird, Fred.	Pratt ...	14	9	$5\frac{3}{4}$	$3\frac{3}{4}$	2	$\frac{3}{4}$	3
4		Blundell ...	Weiss ...	14	$8\frac{1}{4}$	$6\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{3}{4}$	$\frac{7}{8}$	$2\frac{7}{8}$
5	1751	Burton ...	Cory ...	$12\frac{1}{2}$	$4\frac{1}{4}$	$4\frac{1}{4}$	$3\frac{1}{2}$	$2\frac{1}{4}$	*nil*	$2\frac{1}{4}$
6	1658	Chemberlen	Ferguson ...	12	$8\frac{1}{2}$	7 {	1-5 1-$6\frac{1}{2}$	} $1\frac{5}{8}$	$\frac{7}{8}$	$3\frac{1}{5}$
7	,,	Ditto ...	Ditto ...	12	8	7	5	$1\frac{3}{4}$	$1\frac{1}{8}$	3
8		Churchill	Weiss ...	$14\frac{1}{2}$	$8\frac{1}{2}$	$6\frac{3}{4}$	$4\frac{1}{2}$	2	1	3

III.

instruments exhibited at the conversazione of the London held in 1866.

FORCEPS.

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
$2\frac{1}{4}$	Ordinary shank ring ...	Wood, straight, rough	...	1
Straight	Ordinary ...	Wood, straight, smooth	Weight $10\frac{1}{4}$ oz.; 'Dublin Med. Journ.', July, 1842. Murphy, fig. 15.	2
Ditto	Ordinary shank ring ...	Ivory, straight, smooth	...	3
Ditto	Ordinary ...	Wood, straight, smooth	...	4
Ditto	Rack and pinion	Steel bow ...	Churchill, plate vi, figs. 6—9.	5
Ditto	Hole for tape...	Iron bow ...	Murphy, fig. 1.	6
Ditto	Ditto	Ditto	...	7
$\frac{7}{8}$	Ordinary ...	Wood, straight, indented	Murphy, fig. 17.	8

BRITISH

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blades.	Divergence of apices.	Greatest divergence of blades.
9		Collins ...	Coxeter ...	$10\frac{1}{4}$	$5\frac{5}{8}$	$5\frac{1}{8}$	$3\frac{1}{2}$	$1\frac{3}{4}$	1	$2\frac{7}{8}$
10		Conquest	Durroch ...	$13\frac{1}{4}$	$7\frac{3}{4}$	7	$5\frac{1}{4}$	2	$\frac{7}{8}$	$2\frac{7}{8}$
11		Davis, David	Davis, J. Hall	$12\frac{1}{4}$	$6\frac{7}{8}$	7	$5\frac{1}{2}$	$1\frac{5}{8}$	$\frac{3}{4}$	$2\frac{1}{2}$
12		Ditto ...	Ditto ...	$12\frac{1}{2}$	$8\frac{1}{2}$	$7\frac{3}{8}$	$5\frac{1}{2}$	$1\frac{3}{4}$	$\frac{3}{4}$	$2\frac{3}{4}$
13		Ditto ...	Ditto ...	$14\frac{3}{4}$ 12	$10\frac{3}{4}$ $7\frac{3}{8}$	$7\frac{1}{4}$ 4	*nil* $3\frac{1}{8}$	2 1	...	—
14		Ditto ...	Ditto ...	$11\frac{1}{2}$ 10	7 $5\frac{1}{2}$	5 4	4 $2\frac{3}{4}$	$\frac{7}{8}$ $\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{7}{8}$
15		Ditto ...	Ditto ...	$11\frac{1}{2}$ 10	7 $5\frac{1}{2}$	5 4	4 $2\frac{3}{4}$	$\frac{7}{8}$ $\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{7}{8}$
16	1786	Denman ...	Weiss ...	$11\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{1}{4}$	$4\frac{1}{4}$	$1\frac{3}{4}$	$\frac{7}{8}$	$2\frac{7}{8}$
17		Duncan ...	Young ...	13	$8\frac{5}{8}$	$6\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{3}{4}$	$\frac{7}{8}$	$2\frac{7}{8}$
18	1863	Gayton ...	Gayton ...	12	$7\frac{1}{2}$	7	$4\frac{1}{2}$	$1\frac{5}{8}$	$\frac{7}{8}$	3

FORCEPS—*Contd.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
Straight	Ordinary ...	Wood, straight, smooth	Murphy, fig. 6.	9
Ditto	Ordinary curved perineal shanks	Wood, straight, smooth, screw handle	Murphy, fig. 5.	10
Curved	Ordinary shank	Wood, straight, smooth	Churchill, plate xiii, figs. 1—5.	11
—	Ditto	Ditto	...	12
—	Ditto	Ditto	...	13
—	Ditto	Ditto	...	14
—	Ditto	Ditto	...	15
Straight	Ordinary ...	Wood, straight, smooth	Churchill, plate x, figs. 3, 4.	16
$1\frac{1}{4}$	Ordinary, "very easy"	Wood, straight, "conical digital groove"	...	17
Straight	Ordinary, one side only	Wood, straight, smooth, spring rack at extremity	...	18

BRITISH

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrums.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
19		Giles ...	Giles ...	$11\frac{1}{2}$	7	7	$4\frac{1}{2}$	$1\frac{5}{8}$	1	$3\frac{1}{3}$
20	1839	Greenhalgh	Weiss ...	11	$7\frac{5}{8}$	$6\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{3}{4}$	$1\frac{3}{4}$	3
21	,,	Ditto	Ditto	$11\frac{1}{2}$	$8\frac{1}{4}$	$6\frac{1}{2}$	5	2	$1\frac{1}{3}$	3
22	1852	Ditto	Ditto	13	$9\frac{1}{2}$	7	5	2	1	$2\frac{3}{4}$
23		Haighton	Durroch ...	$11\frac{3}{4}$	7	7	$4\frac{5}{8}$	$2\frac{1}{5}$	$\frac{7}{8}$	$2\frac{3}{4}$
24	1775	Hamilton	Ditto	$12\frac{1}{4}$	7	$6\frac{3}{4}$	$4\frac{1}{4}$	$1\frac{3}{4}$	$\frac{7}{8}$	$2\frac{7}{8}$
25		Harper ...	Pratt ...	14	9	$6\frac{1}{2}$	$4\frac{1}{2}$	2	$1\frac{3}{4}$	$3\frac{1}{4}$
26	1861	Hewitt, G.	Weiss ...	13	8	8	5	$1\frac{1}{2}$	$\frac{1}{2}$	$3\frac{3}{4}$
27		Hopkins ...	Coxeter ...	$12\frac{1}{4}$	$7\frac{1}{2}$	$5\frac{5}{8}$	$4\frac{1}{4}$	$2\frac{1}{4}$	$\frac{7}{8}$	$2\frac{3}{4}$
28	1760	Johnson, W. R.	Cory ...	$12\frac{3}{4}$	$7\frac{1}{2}$	$7\frac{1}{4}$	$5\frac{1}{2}$	$1\frac{5}{8}$	$\frac{5}{8}$	$2\frac{1}{2}$
29		Lever ...	Coxeter ...	14	$9\frac{3}{4}$	$6\frac{1}{4}$	$4\frac{1}{2}$	$1\frac{5}{8}$	$\frac{3}{4}$	3

FORCEPS—*Contd.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
2	Ordinary, one side only	Wood, straight, smooth, hinge in handle	...	19
Straight	Ordinary ring	Ivory, straight rough, short	...	20
$2\frac{1}{3}$	Ditto	Ditto	...	21
3	Ordinary shank ring	Ivory, curved, rough, short	...	22
Straight	Ordinary ...	Wood, straight, smooth	...	23
$\frac{1}{3}$	Ditto	Wood, straight, smooth, one to turn back	Murphy, fig. 13.	24
$2\frac{1}{3}$	Ziegler's ...	Ivory, straight, rough finger rests	...	25
Straight	Ordinary ...	Wood, straight, rough	...	26
1	Ordinary ring	Wood, straight, smooth	Murphy, fig. 18.	27
$\frac{3}{4}$	Ordinary ...	Ditto	Churchill, plate vii, figs. 9, 10.	28
$2\frac{3}{4}$	Ordinary shank ring	Ditto	...	29

BRITISH

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
30		Lowder ...	Cory ...	11 1/4	6	5 3/4	4 5/8	1 3/4	1 1/3	3
31		Meadows	Meadows ...	13 1/2	8 1/2	6 1/2	4 1/4	1 3/4	7/8	2 7/8
32		Murphy ...	Coxeter ...	12 1/2	8	6	4	1 7/8	1	3
33		Oldham ...	Weiss ...	13 1/2	8 1/2	6 1/2	4	1 7/8	7/8	3
34	1825	Radford ...	Radford ...	14 3/4	9	6 3/8	5	2 1/16	1 1/8	2 3/4
35		Ditto	Ditto	13 3/4	10 3/4	7 1/4	5 1/4	2 1/8	1 1/4	3
				13	9 3/4	6 1/2	5 1/4	2 1/8	1 1/4	3
36		Ditto	Ditto	13 1/2	10 3/4	7 1/4	5 7/8	2 1/8	1 1/8	3
				13 1/2	10 3/4	7 1/4	5 7/8	2 1/3		3
				13	10	6 1/4	5 1/4	2 1/3	1 1/4 oblique	
37		Ramsbotham, F.	Ferguson ...	13	8 3/8	6 1/4	4 1/2	1 7/8	1	3
38		Robertson	Robertson...	14	7	7	4	1 7/8	1	3
39		Simpson ...	Young ...	13 1/2	8	6 1/2	4 1/2	1 1/2	7/8	3
40	1752	Smellie ...	Cory ...	11 1/4	6 1/2	6 1/4	4 1/2	1 1/2	1/8	2 1/4
41		Walter ...	Durroch ...	14	8 1/2	6 1/2	3 1/2	1 7/8	7/8	2 7/8
42		Ziegler ...	Weiss ...	13 1/4	8 3/4	6 5/8	4 1/2	1 3/4	7/8	3

FORCEPS—*Concld.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
Straight	Ordinary ...	Wood, straight, smooth	...	30
$1\frac{1}{4}$	Ordinary ...	Wood, straight, smooth, finger rests	...	31
Straight	Ordinary shank	Wood, straight, rough	...	32
2	Ditto	Wood, straight, smooth, square tops	...	33
$1\frac{1}{2}$	Ditto	Wood, straight, smooth, short	...	34
Straight	Ordinary ring	Ditto	...	35
3	Ordinary shank ring	Wood, straight, smooth	...	36
$1\frac{7}{8}$	Ordinary shank	Wood, straight, rough	...	37
Curved	Ordinary ...	Wood, straight, smooth	Ramsbotham, 'Obstet. Med.,' 3rd ed., p. 282.	38
2	Ordinary shank	Wood, straight, indented finger rests	Shifting blades for pocket. Murphy, fig. 14.	39
Straight	Ordinary ...	Wood, straight, smooth	Churchill, plate vii, figs. 1—4.	40
Ditto	Ordinary shank	Ditto	...	41
Ditto	One double shank, one single to slide into first	Ditto	...	42

CONTINENTAL

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrums.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
1		Assalini ...	Lollini ...	16	$\left\{\begin{matrix}8\frac{1}{2}\\9\frac{1}{4}\end{matrix}\right\}$	$6\frac{1}{2}$	*nil*	$1\frac{1}{2}$	$\frac{1}{3}$	$2\frac{3}{8}$
2		Baudelocque	Radford ...	$18\frac{1}{2}$	$10\frac{1}{2}$	$7\frac{1}{2}$	6	$2\frac{1}{8}$	$\frac{1}{4}$	$2\frac{3}{4}$
3		Busch ...	Priestley ...	$14\frac{1}{2}$	$7\frac{1}{2}$	6	$3\frac{7}{8}$	$1\frac{3}{4}$	$\frac{3}{8}$	$2\frac{1}{2}$
4		Campbell	Charrière ...	16	...	$6\frac{1}{2}$	...	$2\frac{1}{4}$	$\frac{1}{2}$	3
5	1835	Cazeau ...	Luer ...	18	$9\frac{1}{4}$	7	$5\frac{5}{8}$	$2\frac{1}{8}$	$\frac{1}{4}$	$2\frac{3}{4}$
6		Cederschjöld	Stillé ...	$15\frac{1}{2}$	$9\frac{1}{2}$	7	4	$1\frac{3}{4}$	$\frac{1}{2}$	3
7		Charrière	Charrière ...	18	...	$6\frac{3}{4}$	...	2	$\frac{1}{4}$	$2\frac{5}{8}$
8		Chassagny	Ditto ...	18	10	7	5	$1\frac{1}{2}$	*nil*	$2\frac{1}{2}$
9		Chassagny	...	...	...	...	...	...	...	...
10		Duse ...	Durroch ...	16	$\left\{\begin{matrix}7\\8\frac{1}{2}\end{matrix}\right\}$	6	*nil*	$1\frac{1}{2}$	$1\frac{1}{4}$	$3\frac{7}{8}$
11		Faye ...	Luer ...	18	$9\frac{1}{8}$	$7\frac{1}{2}$	$5\frac{3}{4}$	2	$\frac{1}{8}$	$2\frac{1}{4}$
12		Hardon ...	Hardon ...	...	...	...	...	...	...	...

FORCEPS

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
$5\frac{3}{4}$	Tenon and mortise	Steel, lock at lower extremity	...	1
$3\frac{1}{2}$	Button screw ...	Steel, bow, two blunt hooks	...	2
$2\frac{5}{8}$	Ordinary one side	Wood, straight, smooth, finger rests	Black japanned, very heavy	3
Straight & curved	Button screw ...	Wood, straight, rough	Charrière's 'Catalogue,' p. 119, fig. 364	4
$2\frac{1}{2}$	Pivot ...	Steel, blunt hooks	...	5
$2\frac{3}{4}$	Ordinary one side	Wood, straight, rough, finger rests	...	6
Curved	Button screw ...	Steel, blunt hooks, shifting handles	Ditto, p. 120, fig. 309	7
$3\frac{3}{8}$	Ditto	...	...	8
...	...	...	...	9
Straight	Raised button screw	Steel, blunt hooks	Churchill, plate iv, fig. 7	10
$1\frac{3}{4}$	Pivot ...	Ditto	...	11
...	...	...	...	12

CONTINENTAL

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
13		Hennig ...	Hennig ...	14½	8½	6¼	4¾	2	½	3
14		Hoffmann	...	...	...	...	...	...	...	...
15		Hugenberger	Hugenberger	13	8½	5½	4	1¾	1¼	3¼
16		Huevel, Van	Weiss ...	20½	10	10	4⅝	1⅝	3/16	2⅝
17		Joërg ...	Hennig ...	13	7½	6	4½	1¾	¾	2¾
18		Krassovsky	Hugenberger	16	9½	8½	5½	1¾	½	3¼
19		Lazarêwitch	Lazarêwitch	13¼	...	7¾	4½	2	½	3
20		Levret ...	Hugenberger	15¾	8½	7¼	5½	2	⅝	2⅝
21		Levy ...	Nyrop ...	17	10	6½	5	1½	⅛	2¾

FORCEPS—*Contd.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
$2\frac{3}{4}$	Ordinary ...	Wood, straight, smooth	...	13
...	...	...	...	14
$2\frac{1}{4}$	Ordinary ...	Wood, straight, finger rests	...	15
$2\frac{7}{8}$	Slotted pivot ...	Steel, straight, fluted	Chain saw in blades. See Decapitators	16
$2\frac{3}{8}$	Ordinary one side	Wood, straight ...	...	17
3	Ditto	Wood, straight, smooth, finger rests	...	18
$3\frac{1}{4}$	Tenon and mortise	Steel, fluted, rectangular ends	...	19
$3\frac{1}{2}$	Button screw ...	Wood, straight, smooth, extremities tipped with iron	Churchill, plate ii, figs. 1—5	20
$4\frac{1}{4}$	Ordinary ...	Wood, straight, finger rests, fold in handle, folding blades	...	21

CONTINENTAL

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
22		Lovati ...	Lazzati ...	18	9¼	6½	5½	2	⅛	2¾
23		Martin ...	Luer ...	14	9	9	5	1⅞	¼	2½
24		Mattei ...	Mattei ...	11	9½	6	6	2¼	1	3½
25		Ditto ...	Ditto ...	14¾	7	6	4¾	1¾	⅜	3¼
26		Mesnard ...	Cory ...	13	...	6½	5⅛	2⅛	⅝	3¼
27		Mondotte	Mondotte ...	11	10	6	5½	2	⅜	3
28		Nægele ...	Luer ...	15	8½	8½	4½	1¾	⅛	2¾
29		Nivet ...	Charrière ...	17	...	6	...	1¾	¼	2¾
30		Pajot ...	Ditto ...	13¼	8½	6½	4¾	1⅞	1⅜	3
31		Rizzoli ...	Rizzoli ...	17¾	9	7	5	2⅛	⅜	2¼
32		Rizzoli ...	Rizzoli ...	17¾	9½	7	5½	1¾	⅜	2⅝

FORCEPS—*Contd.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
3	Pivot shifting	Steel, blunt hooks	...	22
$3\frac{3}{4}$	...	...	...	23
$4\frac{1}{2}$	Hole in handle	Wood, rough, horizontal	...	24
$1\frac{3}{4}$	Shifting ...	Wood, rough horizontal, shanks parallel	Charrière's 'Catalogue,' p. 121	25
Straight	Sliding lock in handle	Wood, straight, smooth	Churchill, plate v, fig. 8	26
$2\frac{3}{4}$	Holes in handles	Horizontal ...	...	27
$3\frac{1}{2}$	Pivot ...	Wood, rough, finger rests	...	28
...	Ditto	Steel guarded crotchet and perforator	...	29
Curved	Button screw ...	Blunt hooks ...	...	30
$4\frac{1}{8}$	Ditto	Steel, curved blunt hooks, one at right angles	...	31
$3\frac{3}{8}$	Ditto	Steel, parallel, one blunt hook, one at right angles	...	32

CONTINENTAL

No.	Date	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
33		Rizzoli ...	Rizzoli ...	$16\frac{1}{8}$	$8\frac{3}{4}$	7	$5\frac{1}{2}$	$1\frac{3}{4}$	$\frac{3}{8}$	$2\frac{1}{4}$
34		Saxtorph	Nyrop ...	16	9	$6\frac{1}{2}$	$5\frac{3}{4}$	$1\frac{1}{2}$	$\frac{1}{4}$	$2\frac{1}{2}$
35		Siebold ...	Hugenberger	15	$8\frac{1}{2}$	$7\frac{1}{2}$	$2\frac{3}{4}$	$1\frac{3}{4}$	$\frac{1}{2}$	$2\frac{3}{4}$
36	1843	Talatani ...	Luer ...	$18\frac{1}{2}$	$10\frac{1}{2}$	$7\frac{1}{2}$	$5\frac{5}{8}$	$2\frac{1}{8}$	$\frac{1}{4}$	$2\frac{3}{4}$
37		Trelat ...	Ditto ...	$16\frac{1}{2}$	$9\frac{1}{2}$	7	4	2	$\frac{1}{16}$	3

FORCEPS—*Concld.*

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
$2\frac{3}{4}$	Button screw ...	Steel, parallel ...	...	33
$1\frac{1}{2}$	Ordinary ...	Wood, straight rough, folding	Churchill, plate ix, figs. 8, 9.	34
4	Button screw ...	Wood, straight, smooth, ends everted	Used for 30 years by Russian District Surgeons by order of the Government; used by Rechter, Sen., from 1790 to 1820	35
$2\frac{3}{8}$	Pivot ...	...	...	36
$2\frac{1}{2}$	Ditto	Steel, rough, bowed, transverse steel for traction	...	37

FORCEPS

No.	Date.	Inventor.	Exhibitor.	Length of forceps.	Length of blade to lock.	Length of blade to commencement of curve.	Length of fenestrum.	Breadth of blade.	Divergence of apices.	Greatest divergence of blades.
1	1783 to 1831	Unknown	Beatty, T. E.	$11\frac{1}{2}$	$6\frac{1}{2}$	$6\frac{1}{4}$	$5\frac{3}{4}$	1	$\frac{1}{4}$	$3\frac{1}{4}$
2	1700	Ditto	Cory ...	13	$7\frac{1}{2}$	$7\frac{1}{2}$	5	$1\frac{1}{2}$	*nil*	$2\frac{1}{2}$
3	1752	Ditto	Cory ...	$11\frac{1}{2}$	$6\frac{1}{2}$	6	$4\frac{3}{4}$	$3\frac{1}{8}$	$\frac{1}{2}$	$2\frac{3}{4}$
4		Ditto	Durroch ...	17	$9\frac{1}{2}$	8	7	$1\frac{3}{4}$	$\frac{3}{8}$	2
5		Ditto	Lollini ...	19	$10\frac{1}{2}$	$8\frac{1}{2}$	5	$1\frac{3}{4}$	$\frac{5}{8}$	$2\frac{1}{2}$
6		Ditto	Merriman	$7\frac{1}{2}$	$7\frac{1}{4}$	$7\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$2\frac{3}{4}$
7		Ditto	Smith, Tyler	17	$7\frac{3}{8}$	$5\frac{3}{4}$	$4\frac{3}{4}$	$1\frac{5}{8}$	$\frac{1}{4}$	$2\frac{1}{2}$
8		Japanese	Smith, Tyler	$9\frac{1}{2}$	$4\frac{5}{8}$	$4\frac{3}{8}$	4	$\frac{3}{4}$	$\frac{3}{4}$	$1\frac{3}{4}$

UNKNOWN.

Pelvic curve.	Form of lock.	Form of handle.	Remarks.	No.
Straight	Male and Female	Wood, straight ...	Churchill, plate xii, figs. 3, 4. "A slit in one blade, just above the handle, permits the other blade to pass through, used in 125 cases by the late Dr. Beatty."	1
$2\frac{1}{8}$	Ordinary ...	Ordinary ...	...	2
Straight	Ditto	Ditto	...	3
Ditto	Button screw ...	Steel, 1 blunt hook, 1 perforator	...	4
$4\frac{5}{8}$	Ditto	...	...	5
Straight	Ordinary ...	Wood, smooth, finger rests	...	6
Ditto	Button screw ...	Iron, sharp rack extremities	...	7
Ditto	Square groove	Iron, straight, extremities curved out	...	8

Table

From Doran's

No.	Name.	Weight.		Length.		Length of blade.		Breadth of blade.	
		Oz.	Grms.	In.	Cm.	In.	Cm.	In.	Cm.
1	Dusee ...	22½	640	16	40·5	9¼	23·5	1½	3·8
2	Gregoire ...	25	702	17	43·18	7 8½	17·7 21·5	1¾	4·4
3	Smellie (Short Wooden) ...	5½	156	10½	26·6	6	15·25	1¼	3·17
4	Smellie (Long with pelvic curve)	13½	383	12¼	31·1	7½	19	1¾	3·17
5	Levret ...	34	965	18¼	46·3	9	22·8	2	5
6	Orme ...	8	255	10⅝	27	5½	14	1¼	3·17
7	Orme-Lowder ...	11	309	11	28	5½	14	1¾	4·4
8	Orme-Lowder ...	8	227	10	25·4	5½	14	1⅜	3·5
9	Haighton ...	9½	269	11	28	6½	16·5	2¼	7
10	Osborn ...	11	309	11¼	28·125	6½	16·5	1½	3·8
11	Denman ...	10	283	11	28	6½	16·5	1½	3·8
12	Hamilton ...	12½	354	11	28	6½	16·5	1½	3·8
13	Assalini ...	11¼	319	11¾	29·8	5½	15·5	1½	3·8
14	Busch, D. W. ...	20	567	14	35·6	7¾	19·7	1¾	4·4
15	Mursinna ...	32	908	18	45·7	9	22·8	1¾	4·4
16	Conquest	16	454	13½	34·29	7½	19	2	5
17	David Davis ...	12	340	12½	31·75	7¾	19·7	2½	5·4
18	David Davis ...	11½	323	12½	31·75	7¾	19·7	1¼	3·17

IV

Descriptive Catalogue.

Greatest breadth across blades		Distance between tips of closed blades		Length of fenestræ.		Breadth of fenestræ		Shanks		Remarks.	No.
In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.		
3	7·6	½	1·27	...	...	...	...	...	...	...	1
2⅜	6	almost	*nil*	¾	1·9	...	...	...	...	...	2
2¼	5·7	*nil*	...	...	..	...	...	...	...	...	3
2¾	7	*nil*	...	⅝	1·5	4¾	12·1	...	...	...	4
2⅞	7·3	⅛	·3	1	2·5	5½	14	...	...	...	5
3⅜	8·5	2½	6·35	¾	1·9	3⅞	9·8	...	...	...	6
3¼	8·2	1⅝	4·12	1⅛	2·85	4¼	10·7	...	...	...	7
3	7·6	1½	3·8	¾	2	4	10·16	1½	3·8	...	8
2¾	7	½	1·2	1½	3·8	4¾	12·1	...	...	...	9
2¾	7	¾	1·95	1⅞	4·75	...	...	...	...	...	10
3	7·6	¾	1·9	1	2·5	4½	11·4	...	...	...	11
2¾	7	½	1·27	1	2·5	4¾	12·1	...	...	...	12
2¾	7	½	1·2	...	...	5	12·7	...	...	...	13
2⅝	6·6	⅜	·9	⅞	1·2	4	10·16	...	...	...	14
2⅝	6·6	⅝	1·5	6¾	17·1	¾	1·95	...	...	...	15
3	7·6	¾	1·95	5	12·75	1⅜	3·5	...	...	...	16
3	7·6	1¼	3·17	...	...	1½	3·8	...	...	...	17
2½	6·35	⅝	1·5	...	...	¾	1·9	...	...	...	18

From Doran's

No.	Name.	Weight.		Length.		Length of blade.		Breadth of blade.	
		Oz.	Grms.	In.	Cm.	In.	Cm.	In.	Cm.
19	David Davis ...	20½	490	14½ 12½	36·8 31·75	10 7½	25·4 19	2⅛ 2	5·4 5
20	David Davis ...	5¾	150	10	25·4	6	15·24	2	5
21	David Davis ...	12¼	347*	11½ 10	39·2 25·4	7 5½	17·7 14	1½ ¼	3·8 3·17
		* "Face to left blade": "Face to right blade"							
22	Blundell ...	14¾	413·5	12¾	32·43	8½	21·5	1¾	4·4
23A	Ramsbotham ...	12	340	12¾	32·43	8½	21·5	1¾	4·4
23	Ramsbotham ...	17¾	503·5	13½	34·3	8½	21·5	1¾	4·4
24	Ramsbotham ...	16½	468	14	35·6	8½	21·5	2⅛	5·4
25	Simpson (Short) ...	9½	269	9½	24·1	7	17·7	1⅜	3·5
26	Simpson (Long) ...	17¾	503	14	35·6	8½	21·5	1¾	4·4
27	Simpson (Long) II ...	...	...	...	...	No measurements given			
28	Simpson	21½	610	13½	34·3	8	20·3	1¾	4·4
29	Rigby	16	454	14	35·6	7½	19	1¾	4·4
30	Beatty	10¾	304·5	12½	31·75	8	20·3	1⅜	3·5
30 A	Clark	10½	300	11½	29·2	6½	16·5	1⅝	4·12
31	Edward Martin ...	24¼	688	14¼	36·2	8	20·32	1⅞	4·75
32	Radford	11½	326	14	35·6	10½ 9½	26·6 24·1	2¼ 2⅛	5·7 5·4
33	(Long forceps with asymmetrical blades)	...	...	...	...	...	...	...	...

* Handle and long blade.

Descriptive Catalogue—Contd.

Greatest breadth across blades		Distance between tips of closed blades.		Length of fenestræ.		Breadth of fenestræ.		Shanks.		Remarks.	No.
In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.		
..	...	...	...	3⅜	8·5	1¼	3·17	...	...	...	19
...	...	...	...	...	...	1¼	3·17	...	...	...	20
...	...	...	...	...	...	1 ¾	2·54 1·95	... ...	... ...	Long blade Short blade	21
little	heavier.										
3	7·6	¾	2	4	10 16	1¼	3·17	...	...	...	22
2⅞	7·3	1	2·5	4½	11·4	1¼	3·17	...	...	Original pattern 1862	23 A
3½	8·87	1⅛	2·85	4	10·16	1¼	3·17	...	...	Simpson's modification I	23
3	7·6	1	2·5	5	12·7	1½	3·8	...	..	Simpson's modification II	24
2⅜	6	¼	6·35	3⅞	9·8	⅞	2·2	...	...	...	25
3⅜	8·5	¾	1·95	4¾	12·1	1¼	3·17	...	...	...	26
...	...	...	...	...	...	...	...	...	...	...	27
3¼	8·2	1	2·5	4¼	10·7	1¼	3·17	...	...	Long forceps with Bronze blades	28
3	7·6	½	1·2	5	12·7	1¼	3·17	..	...	...	29
3¼	8·2	1⅛	2·85	5¼	13·3	1	2·5	...	...	...	30
3	7·6	1	2·5	5	12·7	1	2·5	...	...	...	30 A
3⅜	8·5	¾	2	4½	10·7	1¼	3·17	...	...	...	31
3	7·6	¾	1·9	5¾ 5¼	14·6 13·3	1⅝ 1½	4·12 3·8	... ...	... ...	Long blade Short blade	32 33
...	...	...	...	...	...	...	...		...	...	...

From Doran's

No.	Name	Weight.		Length.		Length of blade.		Breadth of blade.	
		Oz.	Grms.	In.	Cm.	In.	Cm.	In.	Cm.
34	Radford	18¼	518	14½	36·8	8½	21·5	2	5
35	Waller I	14	397	14	35·6	9	22·8	2	5
36	Waller II	16½	468	...	...	...	Same as above		
37	Greenhalgh	11¾	333·5	12	30·48	7½	19	1⅞	4·75
38	Unknown ? Lever ..	11¼	320	12	30·5	7½	19	1⅞	4·75
39	Churchill ...	11	312	12¼	31·1	7½	19	3¼	8·2
40	Graily Hewitt (I) ...	13½	383	12½	31·75	8	20·3	1½	3·8
41	Do. (II) ...	13	368	12	30·48	7½	19	1¾	4·4
42	Kristeller ...	29½	837	15½	39·3	9	22·8	1¾	4·4
43	Murphy ...	10	283	12½	31·75	7½	19	1¾	4·4
44	Gayton ...	14¾	418·5	12	30·5	7½	19	1⅝	4·12
45	Rizzoli ...	32½	922	18	45·7	9½	24·1	1⅝	4·12
46	Rizzoli (Short) ...	25¾	730·5	16	40·6	8½	21·5	1⅝	4·12
47	Rizzoli ...	30¾	872·5	17¾	45	6½	16·5	1¼	4·4
48	Lovati ...	32½	922	18½	46·5	10	25·4	1⅝	4·12
49	Young (?) ...	31	880	19	48·26	10¾	27·3	3	7·6
50	Pajot ...	27¼	773	17¾	45	10	25·4	2	5

Descriptive Catalogue—Contd.

Greatest breadth across blades.		Distance between tips of closed blades.		Length of fenestræ.		Breadth of fenestræ.		Shanks:		Remarks.	No.
In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.		
2½	6·35	⅜	·9	5	12·7	2	5	...	...	Long curved forceps with symmetrical blades	34
3	7·6	¾	2	3¾	9·5	1¾	3·5	...	...	Long straight	35
...	...	...	...	...	...	...	...	...	...	...	36
2⅞	7·3	⅞	2·3	4½	11·4	1¼	3·17	...	...	Short straight	37
2¾	7	1	2·5	3¾	9·5	1⅛	2·82	2	5	...	38
3¼	8·2	1	2·5	3¼	8·2	1	2·5	...	...	...	39
3⅛	7·9	⅞	2·2	4¾	12·1	1	2·5	...	...	...	40
3¼	8·2	⅞	2·2	4⅝	11·74	1¼	3·17	...	...	...	41
3¼	8·2	¾	1·95	5	12·7	1	2·54	...	...	...	42
3¼	8·2	⅞	2·2	...	...	1¼	3·17	...	...	...	43
3¼	8·2	1	2·5	4½	11·4	2⅛	3·4	...	...	...	44
2⅞	7·3	⅛	·3	5½	14	¾	1·9	...	...	...	45
2½	6·35	¼	·6	5½	14	1⅝	4·12	...	...	...	46
2⅜	6	⅛	·3	5½	14	1	2·5	Measurements of the extra blade similar			47
2¾	7	⅝	1·5	5	12·7	⅞	2[illegible]	...	...	...	48
...	...	*nil*	...	6½	16·5	1	2·5	...	...	...	49
3	7·6	¼	·6	5	12·7	1⅜	3·5	...	...	...	50

From Doran's

No.	Name.	Weight.		Length.		Length of blade.		Breadth of blade.	
		Oz.	Grms.	In.	Cm.	In.	Cm.	In.	Cm.
51	Levy	23½	666	16½	41·9	8½	21·7	1½	3·8
52	Lazarewitch ...	17	482	10⅞	27·6	8	20·3	1¾	4·4
53	Lazarewitch ...	16½	454	13	33	9¼	23·5	1½	3·8
53 A	Lazarewitch ..	18	510	14	35·6	10½	26·6	1¾	4·4
54	Aveling	10	283	10¾	27·3	7	17·7	1¾	4·4
55	Robertson (?) ...	12	340	12½	31·75	8	20·32	1¾	4·4
55 A	Vacher	9	255	8¼ 9	22·8	6½ 6¼	16·5 15·8	1⅝ 1⅝	4·12
56	More Madden ..	8¾	248·5	10¾	27·3	6½	15·5	1⅜	3·5
56 A	McDonald	25	610	15¼	36·7	9*	22·8	...	...
56 B	Tarnier	33	926	16¼	41·2	10½ †	26·6	2	5
56 C	A. R. Simpson ...	24	681	14	35·6	9*	22·8	2	5

Descriptive Catalogue—Concld.

Greatest breadth across blades.		Distance betweentips of closed blades.		Length of fenestræ.		Breadth of fenestræ.		Shanks.		Remarks.	No.
In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.	In.	Cm.		
2¾	7	*Nil*		4¾	12·1	⅞	2·2	...	...	...	51
2¾	7	½	1·27	4	10·1	1	2·5	...	...	...	52
3	7·6	⅝	1·5	3¾	9·5	⅞	2·2	...	...	...	53
2⅝	6·6	...	...	...	...	...	...	...	...	...	53 A
2¾	7	½	1·27	4⅜	11·1	1¼	3·17	...	...	...	54
3	7·6	1	2·5	4	10·16	1¼	3·17	1½	3·8	...	55
3½ 3¼	8·2	2 1¼	3·17	4¼ 4⅝ 4½	11·7 11·4	...	...	...	...	Handle—Length 2, Depth 1, Breadth ¾ Hinge—1⅝ (Vacher).	55 A
3⅛	7·9	1	2·5	5	12·7	1	2·5	...	...	...	56
...	...	...	...	...	...	...	...	...	...	* Blades + Shanks. Shanks = 4 in. (10·16 cm.)	56 A
3⅜	8·5	⅝	1·5	3¼	9·5	1¼	2·8	...	...	† Blades + Shanks. Shanks = 3 in. (7·5 cm.)	56 B
3⅛	7·9	1	2·54	4	10·16	1⅜	3·5	...	...	° Blades + Shanks. Shanks = 2½ in. (5 cm.)	56 C

Table V.

From Prog. Royal Soc. of Med., Vol. VI. Sec.—History of Med.

	Length of forceps.	Length of blade.	Length of handle.	Greatest breadth of blades.	Distance of broadest part from tip.	Greatest space between blades.	Distance between tips when closed.	Length of fenestra.	Greatest breadth of fenestra.
Gregoire (Mulder) ...	15	$8\frac{1}{3}$	$6\frac{2}{3}$	$1\frac{2}{3}$	1	$2\frac{1}{6}$	$1\frac{1}{4}$	$5\frac{5}{6}$	$\frac{5}{6}$
Gregoire (Museum R.C.S.) ...	17	$8\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{3}{8}$	None	$7\frac{1}{2}$	$\frac{7}{8}$
Smellie I Straight (Mulder) ...	11	$6\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{6}$	$1\frac{1}{4}$	$3\frac{2}{3}$	None	4	$\frac{3}{4}$
Smellie II (with pelvic curve) Mulder ...	$12\frac{1}{2}$	$7\frac{3}{4}$	$4\frac{3}{4}$	$1\frac{1}{3}$	$1\frac{3}{4}$	$3\frac{1}{4}$	None	5	$\frac{3}{4}$
Orme (Mulder) ...	$10\frac{1}{3}$	$5\frac{5}{6}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$	$2\frac{3}{4}$	1	$3\frac{1}{2}$	$\frac{5}{6}$
Lowder (Mulder) ...	$11\frac{1}{3}$	$6\frac{1}{2}$	$4\frac{5}{6}$	$1\frac{1}{2}$	4	$3\frac{5}{12}$	$\frac{2}{3}$	$4\frac{1}{2}$	$1\frac{11}{12}$
Orme-Lowder (Museum R.C.S.) ...	11	$5\frac{1}{2}$	$5\frac{1}{2}$	$1\frac{3}{4}$	4	$3\frac{1}{4}$	$1\frac{5}{8}$	$4\frac{1}{4}$	$1\frac{1}{5}$
Haighton (Guy's Hospital) ...	11	$6\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{7}{8}$	4	$3\frac{1}{4}$	$1\frac{1}{8}$	$4\frac{1}{2}$	$1\frac{5}{8}$
Osborn (Mulder) ...	$11\frac{1}{4}$	$6\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{6}$	$3\frac{1}{4}$	$\frac{1}{12}$	$4\frac{1}{3}$	$\frac{11}{12}$
Osborn (Museum R.C.S.)	$11\frac{1}{4}$	$6\frac{1}{4}$	5	$1\frac{5}{8}$	1	$2\frac{3}{4}$	$\frac{3}{4}$	$4\frac{3}{4}$	1
Denman (Mulder) ...	$10\frac{3}{4}$	$6\frac{7}{12}$	$4\frac{1}{6}$	$1\frac{5}{12}$	$1\frac{1}{6}$	$3\frac{5}{12}$	$\frac{1}{6}$	$4\frac{1}{2}$	$\frac{11}{12}$
Thynne (Mulder) ...	11	7	4	$1\frac{1}{3}$	$1\frac{1}{6}$	$3\frac{1}{4}$	$\frac{7}{12}$	$4\frac{5}{12}$	$\frac{11}{12}$

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INDEX